REPORT DOCUMENTATION PAGE	Form Approved OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	10 Sep 97	

4. TITLE AND SUBTITLE
The Effects of a Model-Based Intervention on Breastfeeding Attrition

5. FUNDING NUMBERS

6. AUTHOR(S)
Sarah e. Wrenn

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Texas Health Science Center

8. PERFORMING ORGANIZATION REPORT NUMBER
97-023D

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
THE DEPARTMENT OF THE AIR FORCE
AFIT/CIA
2950 P STREET
WPAFB OH 45433

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS	15. NUMBER OF PAGES 187
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

The Effects of a Model-Based Intervention on Breastfeeding Attrition

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Lt Col, USAF, NC

Pages: 187

Doctor of Philosophy

1997

University of Texas Health Science Center
at San Antonio

The primary purpose of this study was to determine if a model-based intervention was effective in decreasing breastfeeding attrition. A research-based intervention, grounded in the theory of planned behavior, was used to determine if a postpartum visit, a home visit 2 to 4 days after discharge, followed by a phone call at 10 to 14 days had a positive effect on decreasing breastfeeding attrition. The study design consisted of a two-group quasi-experimental design, measuring variables of breastfeeding attrition, maternal attitudes about breastfeeding, maternal social norms influencing breastfeeding, and maternal perceived behavioral control regarding breastfeeding.

Although there was a lower attrition rate in the intervention group than in the control group, the difference in breastfeeding attrition between the two groups was not statistically significant but was clinically significant. The attrition rate in this study was found to be consistentwith attrition rates reported in the literature. Women returning to work were the most frequently cited reason for weaning whereas latch-on was cited as the major challenge to breastfeeding initiation.

Results of the analysis between the intervention and control groups' scores found no statistical difference between the attitudinal, normative, and perceived behavioral control scores, however, the women's scores did support the operational definitions of the three major concepts. In support of the theory of planned behavior, the results found that maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding, are statistically significant predictors or breastfeeding behavior. Maternal satisfaction with breastfeeding and maternal control regarding breastfeeding were the significant contributors to the model.

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EFFECTS OF A MODEL-BASED INTERVENTION ON BREASTFEEDING ATTRITION

A

DISSERTATION

Presented to the Faculty of

The University of Texas Graduate School of Biomedical Sciences

At San Antonio

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

by

Sarah E. Wrenn, BSN, MSN

San Antonio, Texas

August, 1997

ACKNOWLEDGEMENTS

I would like to extend my deepest gratitude to Dr. Shirley W. Menard, dissertation chair, for her courage, guidance, and unequivocal support during the pursuance of this degree. I wish to acknowledge the advice and support given by the others members of my dissertation committee: Dr. Mary Jones, Dr. Gail Williams, Dr. Bradley Yoder, and Dr. Sharron Humenick. I sincerely appreciate their assistance and expertise.

In addition to my supervisory committee members, several others deserve recognition for their support throughout this study. I am especially grateful to Dr. Douglas Murphy for his expedient and comprehensible statistical advice. Appreciation is also extended to Dr. Helen Bertrand for her time, patience, and encouragement with me in the physiology laboratory. I will always be grateful to the United States Air Force without whose sponsorship this degree would never have been realized. Finally, I would like to thank the postpartum and nursery nurses at Wilford Hall Medical Center who supported my data collection efforts at this facility.

EFFECTS OF A MODEL-BASED INTERVENTION

ON BREASTFEEDING ATTRITION

Publication No. _____

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Many infants are weaned prematurely within the first two weeks of life, due to ineffective management of breastfeeding problems which are unrelated to any physiological deficit in lactogenesis. Objective assessment tools, in conjunction with theory based interventions,

are needed to evaluate the breastfeeding process. The primary purpose of this study was to determine if a model-based intervention was effective in decreasing breastfeeding attrition. A research-based intervention, grounded in the theory of planned behavior, was used to determine if a postpartum visit, a home visit 2 to 4 days after discharge, followed by a phone call at 10 to 14 days had a positive effect on decreasing breastfeeding attrition. The study design consisted of a two-group quasi-experimental design, measuring variables of breastfeeding attrition, maternal attitudes about breastfeeding, maternal social norms influencing breastfeeding, and maternal perceived behavioral control regarding breastfeeding. Breastfeeding procedures and protocols were developed based on the theory of planned behavior's three components: attitudes, subjective norms, and perceived behavioral control. The breastfeeding procedures and protocols were used to guide the researcher's interactions with the intervention group.

The effectiveness of the research-based intervention was evaluated using the following three tools: (1) Breastfeeding Attrition Assessment, (2) H & H Lactation Scale (attitude, satisfaction, control), and (3) Hughes Breastfeeding Support Scale (social norm). These instruments measured the variables described by the theory of planned behavior. One of the challenges to breastfeeding management was the lack of an objective tool to assess breast milk maturity. Since measuring the rate of milk maturation was a relatively new concept, a study comparing the creamatocrit and the Maturation Index of Colostrum and Milk (MICAM) was done to validate the MICAM's use in early lactogenesis.

Although there was a lower attrition rate in the intervention group than in the control group, the difference in breastfeeding attrition between the two groups was not statistically significant but was clinically significant. The attrition rate in this study was found to be consistent

with attrition rates reported in the literature. Women returning to work were the most frequently cited reason for weaning whereas latch-on was cited as the major challenge to breastfeeding initiation. Results of the analysis between the intervention and control groups' scores found no statistical difference between the attitudinal, normative, and perceived behavioral control scores, however, the women's scores did support the operational definitions of the three major concepts. In the theory of planned behavior, attitudes, social norms, and perceived behavioral control are equal determinants of behavior. In support of the theory of planned behavior, the results found that maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding, are statistically significant predictors or breastfeeding behavior. Maternal satisfaction with breastfeeding and maternal control regarding breastfeeding were the significant contributors to the model. Social support influencing breastfeeding had no effect on breastfeeding behavior.

Breastfeeding is a complex process affected by many factors. This study found attitudes, social support, and perceived behavioral control to be important in the assessment of breastfeeding behavior. Although attitudes, social norms, and perceived behavioral control have been indicated as influential factors to breastfeeding, how to best use this information to positively influence breastfeeding remains unclear. External influences can foster change in attitude, social support, and confidence, but a return to a breastfeeding society can only come with the evolution of social change toward breastfeeding. In conclusion, the theory of planned behavior was found to be an acceptable model in which to predict breastfeeding behavior. While this study did support the theory, the results suggested that the influential impact of social norms on breastfeeding behavior require further study.

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CHAPTER I

Introduction

Statement of the Problem

Many breastfed infants are weaned prematurely within the first two weeks of life. Ineffective management of early breastfeeding problems is often the antecedent to early breastfeeding attrition. Primary lactogenic failure is seldom the cause of early breastfeeding attrition because a mother's behavior does influence lactogenic processes. There are many potential management dilemmas that can jeopardize the mother-infant breastfeeding process. One of the challenges is the lack of an effective intervention to guide the mother-infant breastfeeding couple. Breastfeeding duration studies have shown that women often abruptly terminate breastfeeding within the first two weeks postpartum due to breastfeeding problems (Kearney, Cronewett, and Barrett, 1990; Matthews, 1993). However, breastfeeding intervention studies (Grossman, Harter, Sachs, and Amparo, 1990; Hill, 1987; Kistin, Abramson, and Dublin, 1994) are frequently designed to intervene prenatally or during the brief postpartum period, without continuation of professional support after hospital discharge. A second challenge is a lack of clinical measures to assess breast milk maturity from colostrum to mature milk. Direct observation of milk and questioning of mothers provides useful information concerning milk maturity, but these practices do not provide a means of accurately quantifying the maturation process. An objective assessment tool, in conjunction with a theory-based intervention, is needed to evaluate both the maturational progress of breast milk as well as the breastfeeding process.

Many factors have been identified that predict incidence and duration of breastfeeding. However, too often these factors denote nonmodifiable attributes. Examples of nonmodifiable

attributes which identify women who are likely to breastfeed longer are women who are Caucasian, middle to upper class, well educated, married, nonsmokers, twenty to thirty years old, and have delivered healthy term neonates. These women usually had previous breastfeeding experience, and had been breastfed as infants (Janke, 1993). Although these nonmodifiable attributes provide an important source of information, they do not lend themselves to interventions aimed at decreasing breastfeeding attrition.

Several potentially modifiable psychosocial factors are identified with breastfeeding behavior. These include erroneous beliefs and dissatisfaction with breastfeeding (Baranowski, Rassin, Richardson, Brown, and Bee, 1986; Graffy, 1992), lack of social support from family and health professionals (Buckner and Matsubara, 1993; McNatt and Freston, 1992), and lack of breastfeeding knowledge, skills, and confidence (Kearney, Cronewett, and Barrett, 1990; Lawson and Tulloch, 1995; Richardson and Champion, 1992). These factors closely parallel the constructs in Azjen's (1985) theory of planned behavior: attitude (beliefs and satisfaction), subjective norm (social support), and perceived behavioral control (knowledge, skills, and abilities).

The theory of planned behavior postulates that behavioral intentions, which are the immediate antecedents to behavior, are a function of the interaction between one's attitudes, subjective norms, and perceived behavioral control toward a given behavior (Ajzen, 1985; Ajzen and Madden, 1986). As a general rule, the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior. The relative importance of attitude, subjective norm, and perceived behavioral control in the prediction of intention is expected to vary across behaviors and situations. Thus, in some applications it may be found that only attitudes have a

significant impact on intentions or attitudes and perceived behavioral control may be sufficient to account for intentions. However, in most instances, all three constructs are necessary to predict behavioral intention.

The theory of planned behavior is based on the assumption that individuals will take part in a health behavior when they believe their actions will result in satisfaction with the behavior (attitude), when the behavior is considered worthwhile by others who are important to the individual (subjective norm), and when individuals possess the skills, knowledge, and confidence to perform the behavior (perceived behavioral control) (Ajzen,1991). This model includes strategies tailored to increase maternal confidence in her breastfeeding abilities, strengthen her beliefs in the advantages of breastfeeding, and enhance utilization of her breastfeeding support system.

The investigation of quantitative as well as psychosocial measurements is necessary to assist clinical nurses in developing breastfeeding interventions. Traditionally, breast milk maturity was evaluated by the gestational age of the infant, the postpartum day, and the gross appearance of the breast milk (Riordan,1993; Lawrence, 1994). Based on historical data and observation, it is difficult to assess the rapidly changing phases of breast milk (colostrum, transitional milk and mature milk). The clinical benefit of this type of assessment is limited due to its subjective nature and the individual variation in breast milk maturity.

Two methods have been proposed for analysis of breast milk in a clinical setting. Both are based on the fat content of milk which increases after birth from colostrum, a primarily protein substance, to mature milk which is higher in fat. To be clinically useful, a breast milk tool must be devoid of complex techniques, provide timely information, and be reasonably inexpensive. The creamatocrit (Lucas, Bibbs, Lyster, and Baum, 1978) is a method of estimating the fat content of

breast milk based on the centrifugation of human milk in standard capillary hematocrit tubes. Although not widely used in this country, the creamatocrit offers a less complex means of analyzing milk fat when large numbers of samples must be analyzed and the amount of milk is small. However, to be used with confidence, the creamatocrit must be validated against a standard lipid extraction method, which is complex, expensive to perform, and requires a larger volume of breast milk.

The Maturity Index for Colostrum and Milk (MICAM) is a biological marker to assess the maturity of human milk using filter paper chromatography (Humenick, 1987, Humenick, Mederios, Wreschner, Walton, and Hill, 1994). Although measuring the rate of milk maturation is a relatively new concept, this test is currently the only biological marker showing potential usefulness in clinical breastfeeding management. The MICAM may offer its greatest benefit for mothers who have breastfeeding difficulties in the initial stages of lactogenesis.

Purpose of the Study

The purpose of this quasi-experimental study was to determine if a research-based intervention, used in conjunction with a biological marker for breast milk maturation, would be effective in decreasing breastfeeding attrition. A preliminary study was conducted to validate whether or not a quantitative measure would be useful in the patient intervention group. While the MICAM appeared to be clinically useful, research was needed to determine if the test was valid and useful in the clinical arena.

Specifically, this study addressed the following questions regarding primipara breastfeeding mothers at a large military medical center.

1. Is a model-based intervention grounded in the theory of planned behavior effective in decreasing the rate of breastfeeding attrition?

2. Will a model-based intervention influence a mother's perceived infant satisfaction, maternal satisfaction, maternal confidence, and social support in breastfeeding?
3. When taken together, are breastfeeding women's satisfaction, social support, and control better predictors of breastfeeding success than any one of the factors alone?
4. Is the creamatocrit a better index of the fat content of breast milk when fat content is greater than 10%?
5. Is the MICAM a better index than the creamatocrit of the fat content of breast milk when the fat content is less than 5%?

Hypotheses to be Tested

1. Women who participate in a breastfeeding intervention will be less likely to terminate breastfeeding at six weeks postpartum than women who do not participate in the intervention.
2. Women who participate in a breastfeeding intervention will have more maternal satisfaction, social support, and control at six weeks postpartum than women who do not participate in the intervention.
3. Collectively, the intermediate outcomes: 1) maternal satisfaction with breastfeeding, 2) social support influencing breastfeeding, and 3) maternal control regarding breastfeeding are better of predictors of breastfeeding success than any one of the variables alone.
4. There is a correlation between the fat content of breast milk and breast milk maturity.

Aim 1. To show that the creamatocrit can be a measure of the fat content of breast milk when fat content is greater than 10%.

Aim 2. To show that the MICAM, (Maturation Index of Colostrum and Milk), is a better index of the fat content of breast milk when the fat content is less than 5%.

Operational Definitions

1. Breastfeeding attrition was defined as mothers who made the decision to breastfeed for a minimum of six weeks, but terminated breastfeeding before six weeks postpartum. Breastfeeding attrition was measured by the number of infants who were completely weaned at six weeks postpartum.

2. Maternal Breastfeeding Satisfaction was defined as a mother's beliefs and attitudes about breastfeeding, which represented a basis for her perception about the positive or negative consequences regarding breastfeeding, measured by her satisfaction and her infant's satisfaction with breastfeeding. Maternal satisfaction was operationalized with the H & H Lactation Scale. For the purposes of this study, a score of 15 or lower on the H & H Maternal-Infant Breastfeeding Satisfaction Scale Subscale was defined as maternal satisfaction.

3. Maternal Control was defined as a woman's belief in her breastfeeding abilities, her perception of her chances of breastfeeding success, and her willingness to try to breastfeed. Maternal confidence was operationalized with the H & H Lactation Scale. For the purposes of this study a score of 30 or lower on the H & H Maternal Confidence/Commitment Breastfeeding Subscale was defined as maternal confidence.

3. Subjective Norm was defined as the mother's perception of the emotional, instructional, and informational support that she receives from significant others. Subjective norm was operationalized with the Hughes Breastfeeding Support Scale. For the purposes of this study, a score of 90 or higher is defined as social support for breastfeeding.

Assumptions

1. Breastfeeding was the preferred method of infant feeding for healthy term infants.

2. Women who state that they have decided to breastfeed have made their decision under their own volition.

3. The breastfeeding women were honest in their report of their attitudes toward breastfeeding, the social norms influencing their breastfeeding, and perceived behavioral control over their breastfeeding.

4. Women were able to read and understand the questions on the breastfeeding tools used in this study.

Conceptual Framework

Understanding human behavior is an arduous, complex, and often frustrating endeavor. However, understanding human behavior is an essential part of planning and implementing effective health care. Understanding health behaviors such as breastfeeding are particularly challenging because of the emotional, cultural, physiological, social, and sexual factors that influence breastfeeding behavior.

Theoretical models to predict human behavior

The interest in developing theories that attempt to explain or predict behavior is not new. One well-known theory, the health belief model, originated in part from the early works of social psychologist, Kurt Lewin (Rosenstock, 1974). In the health belief model, behavior was predicted by the interrelationship of attitudes among four major concepts: 1) perceived susceptibility, 2) perceived seriousness of the condition, 3) perceived benefits of action, and 4) perceived barriers of taking a given action. This theory operates under the assumption that a person's attitude is an important determinant in deciding on a particular health related action. Although the health belief

model has been used to explain a wide range of health behaviors (e.g., self-reported breast examination, Champion, 1984, utilization of health services, Becker, 1985, and fertility control, Eisen, Zellman,and McAlister,1985), Mikhail (1981) suggested that the model needs further development to clarify construct definitions and investigate difficulties in operationalizing the constructs.

Sweeney and Gulino (1987) used Pender's (1975) health promotion model, an adaptation of the health belief model, as a theoretical model for their research on motivations of breastfeeding decisions among a group of Hispanic primiparous women. In the health promotion model, Pender modified the original model by adding two variables: 1) individual perceptions which are aimed at influencing one's predisposition to engage in a health behavior, and 2) perceived control which described the relationship between internal and external control regarding one's health care decision. Sweeney and Gulino found that two components from the health belief model, modifying factors, and likelihood of action, and one component from Pender's adaptation, individual perceptions, were independently useful in predicting the breastfeeding decision. However, the only significant interpersonal influence on the feeding decision was the women's husband or partner.

Other models are grounded in the theory and research of social psychology. Social psychology theories originated from two schools of thought: behavioral learning theories (Atkinson, 1957; Fishbein, 1963; 1967), and cognitive consistency theories (Osgood and Tannenbaum 1955; Rosenberg, 1956).

Cognitive consistency theory postulated that consistency is a fundamental property of human thought, feelings, and actions. Heider (1944), one of the first social psychologist to propose a theoretical model of human consistency, based his ideas largely on individuals' attitudes

and beliefs toward a given behavior. Heider postulated that the strength of individual attitudes and beliefs would elicit the same response to a given behavior over time. This theory assumed there was a link between the consistency and regularity found in the physical world and consistency in human behavior. However, Ajzen (1988) maintained that human thoughts and feelings did not possess the same consistency characteristics inherent to physical events (e. g. sunrise, gravitational occurrences, changes in seasons). Human behavior is often fluid, modifiable, flexible, and inconsistent. Due to the complexities of human thought and reasoning abilities, Ajzen did not believe behavior could be predicted from attitude alone.

Traditionally, behavioral learning theories are based on the stimulus-response approach of behaviorism (Skinner, 1948). The early social learning theorists applied these behavioral principles to real-life social behaviors, such as personality development and child rearing (Dollard and Miller, 1950; Bandura and Walters, 1963). This behavioral approach was exemplified in Fishbein and Ajzen's (1975) theory of reasoned action. Subsequently, the theory of planned behavior (Ajzen and Fishbein, 1980; Ajzen and Madden, 1986; Ajzen, 1991) extended the theory of reasoned action by adding "perceived behavioral control" to the original constructs of "attitude" and "subjective norm". Thus, when one uses the theory of planned behavior, as in this study, one is automatically including the earlier theory of reasoned action. The theory of reasoned action was based on Fishbein's (1967) and Delaney's (1968) early works which investigated the relationship between attitude and behavior. The theory of reasoned action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980) offers one approach for explaining individuals' intentions to engage in health behaviors. According to the theory, a given behavior is a function of an individual's intention to perform a behavior. The behavioral intention is determined by the

interaction of one's attitude toward the behavior and one's subjective norms regarding the behavior.

Attitude development. Historically, the formation of attitude has stimulated controversy among social psychologists. Areas of debate include the notion that attitude is learned, it is an antecedent to action, and such actions are consistently favorable or unfavorable toward a given behavior (Ajzen, 1988). Fishbein and Ajzen (1975) described attitude as..."a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" p. 6. They further suggested that attitudes can change over time, and that new attitudes can be formed with new experiences or new information. According to the theory of reasoned action, attitudes develop reasonably from the beliefs people hold about the behavior. In the case of attitudes toward a behavior, each belief links the behavior to a certain outcome or to some other attribute such as the cost incurred by performing the behavior. Fishbein and Ajzen postulated that the stimulus-response relationship created in this manner correspond to one's beliefs about objects, actions, and events. They suggested the implication of this relationship is that an attitude toward a behavior is closely related to beliefs about the behavior. Accordingly, a person's attitude toward any behavior, action, or event is a function of his beliefs about the behavior and the corresponding responses associated with those beliefs.

According to the theory of reasoned action (Ajzen and Fishbein, 1980), beliefs are formulated from one's attainment of important information about a specific behavior. In the case of attitudes toward a behavior, each belief links the behavior to a certain outcome, or to some other attribute such as the importance of performing the behavior. Ajzen and Fishbein (1980) explained that since the characteristics associated with the behavior are already valued positively or negatively, an attitude (positive or negative) is automatically developed toward the behavior.

Thus, positive attitudes are developed toward behaviors associated with desirable outcomes and negative attitudes are developed toward behaviors associated with negative outcomes.

In an adaptation of the theoretical constructs, Cohen, Fishbein, Ahtola, (1972), and Petkova, Ajzen, and Driver, (1995) found satisfaction toward a given behavior could replace attitudes and beliefs by measuring one's satisfaction derived from the behavior and the importance placed on the behavior. Interestingly, they found that the measures of satisfaction of a given attribute are derived from the same information as the original belief and attitude criteria.

Subjective norm. Subjective norms, the theory of reasoned action's second major determinant, were also postulated to be a function of beliefs (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). Subjective norms are based on the person's belief that specific individuals or groups support or do not support the performance of a given behavior (Ajzen, 1988). Examples of subjective norms are significant others (e. g. spouse, relatives, coworkers, and friends). Historically, Cooley (1902) was one of the first social philosophers to recognize the importance of the opinions of others on the self. Cooley suggested the concept of the "looking glass self" whereby the image of ourselves was based on others' perceptions and the importance one placed on those perceptions. Mead (1934) continued in this same conceptual framework with the emergence of what he termed the "generalized other". The generalized other is information that one maintains about the general expectations and attitudes of others. Mead maintained individuals use the concept of generalized other when they attempt to evaluate the social appropriateness or acceptability of a given action or behavior.

Subjective norm is defined (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) as a measure of the influence of the social environment on behavior. However, subjective norm's

influence may not demonstrate an immediate or direct influence on the given behavior; rather it corresponds to the importance one places on the opinions of other individuals or groups. Thus, perceived social pressure is assumed to play an important role in whether or not an individual will or will not perform a given behavior. Since subjective norms refer to the perceived opinion of people other than the individual, they may also be called social norms (Zuckerman and Reis, 1978). Social normative beliefs are concerned with the likelihood that important individuals or groups approve or disapprove of performing a given behavior.

Intention. The hallmark of the theory of reasoned action is the assumption that behavioral intention is the antecedent of behavior (Fishbein and Ajzen, 1975). The authors defined behavioral intention as the probability that one will perform a given behavior. Although many factors may influence the strength of the intention-behavior relationship, the authors characterized behavioral intentions as the best possible predictor of a person's actions. According to the theory of reasoned action, attitudes and subjective norms assume a central position in the etiology of behavior by means of their influence on intentions, and not by their direct impact on behavior (Bentler and Speckart, 1979).

Intentions are assumed to capture the motivational factors that influence a behavior (Ajzen, 1991). They are indications of how hard people are willing to try, or how much effort they are planning to exert, in order to perform the behavior. It is generally assumed the stronger one's intent to perform a behavior, the more likely it is one will actually perform the behavior. Thus, the stronger people's intentions to engage in a behavior or to achieve their behavioral goals, the more successful they are predicted to be.

Ajzen and Madden (1986) stated a behavioral intention could only predict or influence behavior if the behavior in question is under volitional control. Volitional control is said to occur

when an individual has complete control over the decision to perform the behavior or not to perform the behavior. Although some behaviors may fall under the definition of volitional control, many behaviors may be influenced by factors not under a person's immediate control. Ajzen (1991) postulated the performance of many behaviors was significantly influenced by nonmotivational factors, such as availability of opportunities and resources. Ajzen categorized opportunities and resources into two groups: internal control factors and external control factors. These opportunities and resources can be categorized as internal and external control factors. Examples of internal factors are skills, abilities, knowledge, and adequate planning, whereas time, opportunity, and dependence on others are examples of external control. Ajzen believed that these factors constituted a person's actual control over the decision to perform or not perform a behavior. Collectively, these factors represent people's actual control over the behavior. If a person possesses the resources and opportunities to perform a behavior, the chance of successful performance of the behavior is believed to be quite high.

Despite its success in behavior prediction, the theory of reasoned action has been criticized for failing to take into account other factors that may have an effect on intention and behavior. Sheppard, Hartwick, and Warshaw (1988) criticized the Fishbein - Ajzen model because the theory could only be used to predict behaviors that were under volitional control and it lacked a provision for the possibility of failing to achieve one's goal. Ajzen (1991) addressed these criticisms in his conceptual modification of the theoretical framework to include prediction of nonvolitional behaviors.

Minard and Cohen (1981) criticized the theory of reasoned action's equivocal distinction between what was perceived as attitude and what was perceived as social norm. Since attitude and social influence are interrelated, they found it difficult to tease out social influence as

a separate entity from attitude. They postulated that problems could arise when operationalizing the theory.

Ajzen (1991) refuted the criticism by explaining that "theoretically, personal evaluation of a behavior (attitude), socially expected mode of conduct (subjective norm), and self-efficacy with respect to the behavior (perceived behavioral control) are very different concepts each of which has an important place in social and behavioral research". p. 199. The theory of planned behavior's success is rooted in the interrelationship of the three components--attitude, social norm and perceived behavioral control. Distinction of the three components can be maintained by the clarity of the instrument item (Ajzen, 1988).

The theory of reasoned action relies on intention as the sole predictor of behavior. This reliance on intention will be sufficient whenever control over the behavioral goal is possible. However, there are many circumstances in which complete control over an action or behavior is not possible. In an attempt to go beyond purely volitional action, the theory of planned behavior was proposed to extend the original theory to include behaviors that were not under complete volitional control (Ajzen and Fishbein, 1980).

The theory of planned behavior. The theory of planned behavior (Ajzen, 1988; Ajzen, 1991; Ajzen and Fishbein, 1980; Ajzen and Madden, 1986) is a model for predicting human behavior that is influenced by beliefs and attitudes, social influences, and one's perceived control over the performance of a behavior. The assessment of one's actual control over the performance of a behavior cannot be underestimated. However, it is virtually impossible to assess actual control in advance of performing the behavior because of many factors which can not be anticipated or otherwise controlled. It also must be accepted that an investigator's ability to measure actual control is very limited. Consequently, it is generally not possible to know whether

or not an individual has the necessary resources and opportunities until the individual attempts to perform the behavior.

It is, however, possible to measure perceived control. According to Ajzen and Madden (1986) perceived behavioral control is an individual's belief as to how easy or hard they perceive the behavior to be. Since perceived behavioral control is measurable, Ajzen and Madden maintained that perceived behavioral control had more psychological importance than actual control. Perceived behavioral control constitutes an essential part of the theory of planned behavior. Thus, the theory of planned behavior is an expansion of the theory of reasoned action with the addition of the construct, perceived behavioral control. Several studies have found that the inclusion of this construct has significantly enhanced the prediction of behavioral intention (Ajzen, 1985; Ajzen and Maden, 1986; Madden, Ellen, and Ajzen, 1992).

Ajzen (1991) believed the concept, perceived behavioral control, differed greatly from Rotter's (1966) concept of perceived locus of control. Ajzen suggested that the most significant difference in these two concepts was their fluctuation in a given circumstance. Ajzen maintained that perceived behavioral control is likely to change in a given situation, especially if a person develops new skills or knowledge, whereas locus of control is a generalized expectancy that remains stable across situations and forms of action.

Ajzen's (1991) perceived behavioral control is conceptually similar to Bandura's concept of "perceived self-efficacy" (Bandua, 1977; Bandura, Adams, and Beyer, 1977). Perceived self-efficacy emphasizes one's ability to make necessary decisions in the accomplishment of tasks or behaviors. Self-efficacy beliefs are influenced by one's behavior choice, preparation plan, and individual effort to succeed (Bandura, 1982). Bandura, Adams, Hardy, and Howells (1980)

provided empirical evidence that people's behavior is strongly influenced by the confidence they possess in their ability to perform the behavior.

The relationship between perceived behavioral control and behavioral intentions demonstrates the motivational influence of control on behavior through intentions (Madden, Ellen, and Ajzen, 1992). Many investigators have shown that people's behavior is strongly influenced by their confidence or perceived behavioral control in successfully performing the behavior (Ajzen and Driver, 1992; Beck and Ajzen, 1991; Doll and Ajzen, 1992; Parker, Stradling, and Manstead, 1996).

The theory of planned behavior related to health behaviors. The theory of planned behavior offers an excellent approach to explain and predict human behavior. Theoretical research in other disciplines found intention to perform a behavior the most powerful predictor of subsequent behavior (Coreil and Murphy, 1988; Gielen, Faden, O'Campo, and Paige, 1992). The theory of planned behavior was successful in predicting many different health related behaviors (e.g., attitude and behavior, Ajzen and Timko, 1986; self breast examination and exercise,Theodorakis, 1994; exercising behavior, van Ryn, Lytle, and Kirscht, 1996; Godin Valois, and Lepage, 1993; oral rehydration use Hounsa, Godin, Alihonou, Valois, and Girard, 1993; weight loss, Schifter and Ajzen, 1985, and condom use , Corby, Schneider, and Wolitski, 1996).

The theory of planned behavior in relationship to breastfeeding. As a general rule, the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be an individual's intention to perform the behavior under consideration. This theory provides the basis for breastfeeding strategies tailored

to strengthen the mother's beliefs in the advantages of breastfeeding, enhance utilization of her breastfeeding support system, and increase maternal confidence in her breastfeeding abilities.

Janke (1992, 1994) used the theory of planned behavior as the theoretical basis for developing a tool that would predict breastfeeding attrition. Her instrument, the Breastfeeding Attrition Prediction Tool (BAPT) utilized empirical indicators to measure the concepts of maternal breastfeeding attitude, social norm, and perceived behavioral control. Janke (1994) found women who weaned prematurely received less breastfeeding support from their social and professional network, believed breastfeeding was difficult, and saw more advantages to formula feeding than breastfeeding.

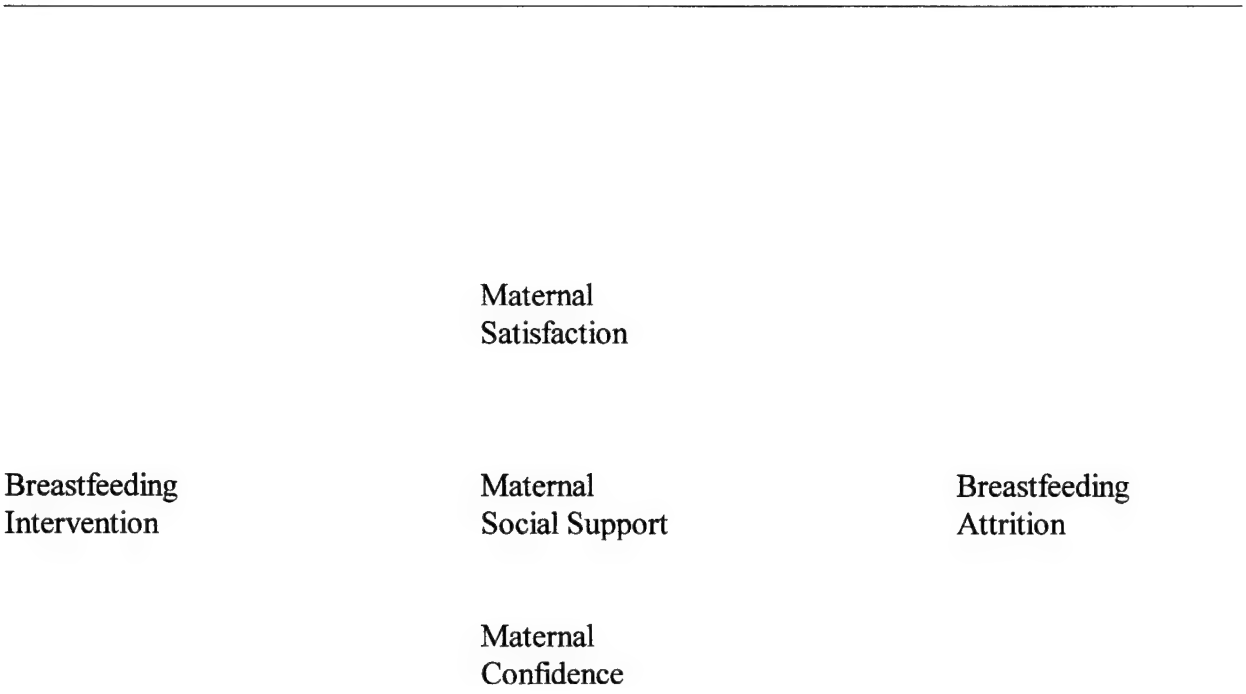
Manstead, Proffitt, and Smart (1983) used the theory of reasoned action to predict how primiparous and multiparous women intended to feed their infants and how they actually fed their infants during the six weeks following delivery. Attitude, social norm, and behavioral intention measurements were assessed in the third trimester. Although their findings supported the theory of reasoned action, they found that the relative importance of the attitudinal and social normative components of the model tended to vary with the mothers' breastfeeding experience. Subsequently, Manstead, Plevin and Smart (1984) conducted a similar study using the same theoretical model and outcome variable, but the sample consisted of only primiparous women. Although the findings were again largely supportive of the theory of reasoned action, their findings suggested that maternal attitudes toward infant feeding method were more important than the input from their social support network.

The theory of planned behavior provides the foundation for a strategy designed to increase maternal confidence in her breastfeeding abilities, strengthen her beliefs in the advantages of breastfeeding, and enhance utilization of her breastfeeding support system (Figure 1). In this

study, breastfeeding protocols were developed based on the theory's three major components. The protocol contains an attitude section, which measures beliefs that may influence a mother's satisfaction with breastfeeding, followed by interventions to help alleviate the erroneous beliefs and strengthen positive beliefs. The second part of the protocol focuses on maternal social norms regarding breastfeeding, and identifies significant people that influence the maternal decision to continue breastfeeding, followed by interventions that can enhance support provided by this network. The third part focuses on maternal perceived behavioral control concerning breastfeeding. The perceived behavioral control section lists common occurrences faced by breastfeeding women that may affect their ability to breastfeed, followed by interventions that are designed to help mothers manage the occurrence/s with little or no interruption in breastfeeding.

Figure 1

The Breastfeeding Outcome Model



Hypothesized model adaptation from Ajzen, 1991.

Summary

Fishbein and Ajzen (1975) proposed the theory of reasoned action to explain the basis of decision-making for behaviors, which were under volitional control. The theory of planned behavior is an extension of the theory of reasoned action made necessary by the theory of reasoned action's limitation in coping with behaviors which may be beyond an individual's voluntary control. The theory of planned behavior distinguishes itself from the theory of reasoned action by the addition of the construct, perceived behavioral control, with its inherent ability to influence nonvolitional behavior.

The theory of planned behavior (Ajzen, 1985, 1991) provides a useful conceptual framework for dealing with the complexities of human social behavior. The theory incorporates some of the central concepts in the social and behavioral sciences, and it defines these concepts in a way that permits prediction and understanding of particular behaviors in specified contexts.

The theory of planned behavior is based on the assumption that an individual's intention to perform a behavior is dependent on the mediation of three conceptual variables: attitude, social norm, and perceived behavioral control. According to Fishbein and Ajzen (1975), individuals' attitudes toward a behavior are a function of their beliefs about the positive or negative consequences of performing the behavior. The social normative factors are functions of individuals' expectations of significant others, weighted by their motivation to comply with these expectations. Control reflects the perceived ability individuals have over their intention to perform a behavior.

The theory of planned behavior (Ajzen, 1985; 1991; Ajzen and Madden, 1986) is based on the assumption, that individuals will take part in health behaviors when they believe that their action will result in satisfaction with the behavior (attitude), when the behavior is considered

worthwhile by others who are important to the individual (social norm), and when individuals possess the skills, knowledge, and confidence to perform the behavior (control). These fundamental components can serve as a basis to predict a woman's intent to breastfeed. According to the theory of planned behavior, breastfeeding behavior can be predicted by determining breastfeeding intent which, in turn, is predicted by a woman's attitude toward breastfeeding, her social norms influencing her breastfeeding, and her perceived control regarding breastfeeding. The theory of planned behavior provides a model to identify breastfeeding influences, which can provide the initial underpinnings toward the development of timely interventions to curtail breastfeeding attrition.

CHAPTER II

Literature Review

Infancy is characterized by a period of rapid growth, which demands a readily available source of energy to meet these needs. Term neonate energy demands are between 110 to 120kcal/kg/day, whereas a nine-month old energy demand has decreased to approximately 90 to 95 kcal/kg/day (Hardy and Kleinman, 1994). While glucose is the fetus' main energy source, it is not an adequate source of energy for neonates and young infants. To meet the high caloric demand of early infancy, neonates and young infants must obtain a large portion of their calories from fat. The best source of dietary fat to foster infant growth is breast milk.

Breast Milk Lipids

There are many reasons for the accepted belief that human milk is the best food for infants. First, human milk fat provides 40-60% of the caloric energy required for infant growth. Most of the fats absorbed by the infant are used to provide energy, while fats not immediately metabolized are stored for later use. Second, although commercial infant formulas come close to matching human milk in nutritional components, significant differences are found between human milk fats and fats used in commercial formula. Even though the differences in breast milk and commercial formulas are fairly well known, the significance of these differences is not totally understood (Jensen and Jensen, 1992; P. B. Lawrence, 1994).

The major differences in the fat components of human milk versus formula are the quality of fats, fatty acid composition, and absence of cholesterol in commercial formulas. The composition of fatty acids and the unique position of the fatty acids on the glycerol molecule are credited for the increased absorption of human breast milk lipids over cow's milk lipids (Hardy

and Klein, 1994). Additionally, when the butterfat of cow's milk is replaced by vegetable oils in infant formulas to provide better fat absorption, most of the cholesterol is removed. Although cholesterol is often discussed in the literature as the lipid of interest, the positive or negative influence of cholesterol intake in early infancy on lipid metabolism in later life has yet to be determined (Kallio, Salmenpera, Siimes, Perheentupa and Miettinen, 1992; P. B. Lawrence, 1994). Since milk fat is such an important energy contributor to the growing infant, an understanding of milk fat components and functions are essential in the management of clinical breastfeeding problems.

Function of breast milk fats. Koletzko, Thiel, and Springer (1992) described three major roles human milk fats perform in meeting the growth demands of the human infant. First, fats provide a source of essential fatty acids which are necessary for cell membrane development. Cell membrane development is largely dependent on the content and composition of polyunsaturated fatty acids in membrane phospholipids. Second, even though the majority of cell division and brain growth takes place prenatally, significant changes in brain lipid occur postnatally. The third major function of breast milk lipids is to serve as a transport vehicle for the fat-soluble vitamins A, D, E, and K as well as serving as a precursor for prostaglandin.

Components of breast milk lipids. Once lactation is established, human milk has a fat content of 3.5% to 5% in women who deliver either preterm or full-term infants (P. B. Lawrence, 1994). The lipids in human milk are contained in a membrane-bound fat droplet called the milk fat globule. Triglycerides are found in the central portion of the fat globule, while the globular membrane is composed of phospholipids, sterols, and proteins (Neville, Allen, and Watters, 1983). Triglycerides account for over 98% of the fat in the milk fat globule; the remaining 1-2% are primarily diglycerides, phospholipids, and cholesterol. The triglyceride content of human milk increases during the course of lactation. Initially, triglycerides in colostrum are approximated at 1-2 g/dl increasing to 4-5 g/dl in mature milk (P.B. Lawrence, 1994; Neville, Allen, and Watters, 1983). However, cholesterol concentrations found in human milk do not

change dramatically. Clark, Ferris, Fey, Brown, and Hundrieser (1982) determined that the cholesterol in breast milk remained fairly stable between 2-16 weeks postpartum, with levels at 10.3 mg/100 ml at 2 weeks and decreasing to 8.3mg/100 ml at 16 weeks.

Triglycerides are insoluble in water and are transported in the body in emulsions, in lipoproteins, and as free fatty acids (Hamosh and Bitman, 1992; Jensen and Jensen, 1992). Most triglycerides cannot be absorbed into cell walls and membranes. They must be broken down to free fatty acids and glycerol by the enzymatic lipases which are found in the infant's intestine (gastric lipase), as well as in breast milk and mammary gland (milk digestive lipase) (Hamosh, 1994). Among the fatty acids synthesized in the mammary gland, many are in the form of medium chain acids which are unique to human milk (Neville, Allen, and Watters, 1983).

The greatest physiological significance of essential fatty acid intake is their effect on the brain and other cell membranes of the breastfed infant. Although the majority of cell division and brain growth takes place prenatally, significant changes in brain lipid take place postnatally, especially myelinization (P. B. Lawrence, 1994). The fatty acid composition of milk lipids is very susceptible to dietary manipulation and can be altered by changes in the type and amount of dietary fat found in the maternal diet. In particular, fatty acids synthesized in the mammary gland are the fatty acids most influenced by maternal diet (Neville, 1989). However, the total fatty acid content does not vary greatly in breast milk. Makrides, Simmer, Neumann, and Gibson (1995) collected seven day samples of breast milk during the 6th, 16th, and 30th week of lactation. They found the total proportions of fatty acids were unchanged, but there were some significant differences in the individual polyunsaturated fatty acids.

Breast milk lipid variability. The role of lipids in human milk variability is well established. Macey (1949) noted changes in human milk composition within one feeding, during the course of a day and with the duration of lactation. Higher fat contents were present in the

mornings and at the end of a feeding. The fat content increased with lactation duration until mature milk was attained.

Clark et al (1982) observed that the amount of total lipid increased significantly from 3.9 g/100 ml at two weeks to 5.2 g/100 ml at 16 weeks postpartum ($p < 0.005$). The total fatty acid composition and total cholesterol remained uniform during this period. These observations were made from pooled morning and afternoon samples of breast milk. Neville, Keller, Seacat, Casey, Allen, and Archer (1984) took 5 ml samples of breast milk before a feeding (foremilk), 2 to 5 minutes into the feeding, and at the end of the feeding (hindmilk). They determined the average lipid content of pumped breast milk doubled in the interval from the beginning of the feed to the end of a feeding. They also noted considerable variation (28%) in the fat content among the subjects which was attributed to sampling techniques (hand-expression and electric pump) and sample volumes. They suggested small feed samples might not provide the best means of estimating fat content, particular when the individual fat content is important.

Valentine, Hurst and Schanler (1994) found that hindmilk improved weight in low-birth-weight (LBW) infants who were fed fortified hindmilk. Fifteen LBW infants were fed pumped hind milk, which was defined as the milk obtained after 2 to 3 minutes of double pumping both breasts. Infant weight gain increased significantly, from a range of 0.7-13 g/kg/day during the first week to a range of 12-21 g/kg/day during the second week ($p < 0.001$). They concluded the rate of weight gain was significantly related to the change in milk fat concentration, since the weight gain was not due to initial milk feedings consisting of pooled milk or to birth weight, gestational age, or age at evaluation. Other growth parameters (length and head circumference) did not change significantly. Although this study did not have a specific control group, slower weight gains were observed in babies whose mothers could not produce enough milk to fractionate their milk supply into foremilk and hindmilk.

Among five different sampling times within a 24 hour period, Lammi-Keefe, Ferris, and Jensen (1990) found the lipid concentrations tended to be higher in the 1000 hour samples. Similar results were found in a subsequent study in which the investigators found that morning milk samples (0600-1000 hours) had significantly higher lipid concentrations (2.93 % +/- 0.32) than any other time period ($p = 0.05$) (Jensen, Lammi-Keefe, Ferris, Jackson, Couch, Capacchione, Ahn, and Murtaugh, 1995). The dramatic change in the amount of milk fat during a given feeding has provided the basis for recommending that infants nurse until satiety as opposed to strict time limits (R. Lawrence, 1994).

Maternal adiposity and parity have been reported to affect the nutritive properties of breast milk. Results from the DARLING (Davis Area Research on Lactation, Infant Nutrition and Growth) Study indicated that there was a significant correlation between breast milk lipid concentrations and maternal percent of ideal body weight (IBW). They found women with higher percent IBW had significantly higher milk lipid concentrations at 6, 9, and 12 months of lactation ($p < 0.01$). The investigators theorized there might be a correlation between higher plasma triglycerides concentrations and breast milk lipid concentrations. However, this relationship has yet to be explored (Nommsen, Lovelady, Heinig, Lonnerdal, and Dewey, 1991). Findings from the DARLING Study also suggested that parity greater than four was associated with a decreased breast milk lipid content. Since this relationship is only found empirically, further research is warranted.

Breast milk fat analysis. Clinical breast milk assessment has traditionally been evaluated by the gestational age of the infant, postpartum days, and gross appearance of the breast milk (Riordan, 1993). Historically, colostrum was believed to be present from delivery to approximately five days postpartum. Transitional milk was believed to be present from the sixth to approximately the fifteenth day postpartum and mature milk from the fifteenth day (Macey, 1949). Although colostrum has a different appearance and texture than mature milk, it is difficult to assess quantitative or qualitative properties based on observed appearances of breast

milk and postpartum day. A complete assessment of lactation performance must include some indication of the composition of nutrients in the milk.

The ability to estimate breast milk components has been available for many years. However, significant variability in methodologies used to collect and analyze human milk can represent a challenge to the investigator. Jensen, Clark, and Ferris (1980) noted, in earlier published reports, that human milk sampling techniques were extremely variable, accounting for broad ranges of breast milk lipid values. They reported many early studies collected samples without noting collection points (beginning, middle, or end of a feeding) or time of day. Since breast milk fat content changes within a feeding, between feedings, and throughout the day, the method and collection time can affect the milk fat estimation. Due to the variability in milk fat content during and between feedings, complete expression of the breast by means of an electrical milk pump over a period of 24 hours has been recommended as the most accurate measurement of breast milk fat (Jensen, 1989). Although this method offers objectivity and accuracy, it may be unacceptable to breastfeeding women and poses ethical considerations, such as nipple confusion, latch-on difficulties, and decreased skin-to-skin contact. Alternatively, since a 24-hour collection is often not available, two milk samples taken at consistent times from each subject has been shown to decrease variability. Ferris and Jensen (1984) recommended midmorning and late afternoon as possible times to represent the high and lower points in breast milk fat content.

Another breast milk collection concern is the effect of electric pumps on the amount of breast milk fat. Although adhering to strict collection protocols can enhance accurate results, the use of electric pumps for milk extraction can overestimate fat content results (Jensen et al.1995). While it is not feasible to measure the exact amount of milk taken naturally by a nursing infant, milk fat content may be overestimated because pumping is usually continued as long as milk can be obtained, whereas an infant nurses until satiety. Thus, a pumped milk volume may be larger and contain more hind milk than an infant's normal feeding volume. When comparing hand

expressed milk with pumped milk, Koletzko, Thiel and Springer (1992) cited reports of 2.1 to 3.6-fold increase in milk fat content between fore milk and hindmilk using electric pumps, whereas they only found a 1.7-fold increase in foremilk and hindmilk with hand expression.

Breast Milk Lipid Analysis

Lipid extraction. Since lipids are recognized as the most variable component in breast milk, lipid analysis creates certain challenges (Jensen and Clark, 1984). The most reliable means of fat analysis is lipid extraction. Two of the most common lipid extraction techniques used for human milk analysis are the Roese-Gottlieb (Horwitz, 1975) and the modified Folch (Folch, Lee, and Sloan-Stanley, 1957) procedures. However, Collins, Jackson, Lammi-Keefe, and Jensen (1989) reported both procedures have specific limitations. The Roese-Gottlieb procedure does not recover phospholipids completely and the Folch procedure is known to create unwanted emulsions. Both procedures require advanced technical skills and considerable time for completion.

Although lipid extraction methods are respected for their individual precision, the volumes of milk required pose a significant barrier. Some investigators have used a dry column method of lipid extraction, whereby milk is mixed with sodium sulfate and Celite and extracted with a chloroform/methanol mixture (Jensen, Bitman, Wood, Hamosh, Clandinin, and Clark, 1984; Lonnerdal, Smith, and Keen, 1984). Collins, Jackson, Lammi-Keefe, and Jensen (1989) compared total lipid as well as lipid components using both the dry method and modified Folch procedure. They found no significant differences between the two methods for either total lipids or lipid components, and the dry method has the advantage of requiring less volume of milk.

Creamatocrit. In 1978, Lucas, Gibbs, Lyster, and Baum described a method of estimating the fat content of breast milk based on the centrifugation of human milk in standard capillary hematocrit tubes. Thus, this method was coined the "creamatocrit". The creamatocrit is a measurement of the percent by volume of lipid in a milk sample. Since the direct creamatocrit does not represent the weight percentage of fat in the sample, a standard curve must be

established. This can be accomplished by comparing the creamatocrits to a classic method of lipid extraction (Lonnerdal, Smith and Keen, 1984). After establishment of this curve, this measurement can be correlated with other methods of lipid determination and can be converted to calorie value (Goldfarb and Savadove, 1991). Lucas et al, who originally standardized the creamatocrit against the Gerber lipid extraction method, developed the following formula to estimate the amount of fat in milk: fat (g/L) = creamatocrit % - 0.59/.146. The creamatocrit provides the following advantages: 1) requires minimal lab equipment, 2) reliable for clinical use, 3) minimal cost to perform, 4) requires only a small sample of breast milk, and 5) results not affected by freezing. The creamatocrit poses the following disadvantages: 1) not commonly used in this country, 2) requires centrifuge and capillary tubes, and 3) requires initial validation with lipid extraction method (Lucas et al., 1978; Jensen et al., 1984). Although the creamatocrit is easier to use in a field setting, an accurate creamatocrit must be obtained from a 24-hour collection of breast milk (M. C. Neville, personal communication, February 6, 1996).

Maturation index of milk and colostrum (MICAM). The more clinical approach to assess the nutritional adequacy of breast milk is to assess the maturity of milk through the three stages: colostrum, transitional milk, and mature milk. The assessment of breast milk maturity is important because milk fat content increases in transitional milk, and is relatively constant in mature milk. Humenick (1987) developed the Maturation Index of Colostrum and Milk (MICAM), which is a biological marker to assess the maturity of human milk using filter paper chromatography. She discovered five sequential patterns of colostrum and breast milk, which can be observed in the process of milk maturation. These findings were interpreted using the work of Ling, Kon and Porter (1961). They reported that breast milk fat was found in an emulsion form and was surrounded by a fat-globule membrane. However, as the breast milk matures and the milk fat content increases, lipase begins to break down the fat and cause its dispersion throughout the milk. Humenick surmised that the first four patterns were due to the

breakdown of fat emulsion that occurs as breast milk matures. The rationale for stage four and five remain under investigation. In a more recent study using the MICAM, Humenick et al. (1994) found that mature milk could be present as early as the seventh postpartum day and that transitional milk could still be present as late as the 42nd postpartum day. These findings support her earlier research that suggested there is a significant individual variability in the rate of breast milk maturity.

The MICAM has the following advantages: 1) easy to perform, 2) requires only drops of milk 3) negligible cost and 4) compatible with clinical/home setting. The MICAM has the following disadvantages: 1) minimal published data on test, 2) possible interpretation problems and 3) unclear scientific basis for ring patterns (Humenick, 1987; Humenick et al.1994).

In some instances, the complete assessment of lactation performance must include some indication of the composition of nutrients in the milk, necessitating the extraction of a representative sample of the day's production. To ensure a given sample is representative of the day's supply of milk, collection techniques must be carefully timed and orchestrated so that they will generate the desired results, but not be disruptive to the breastfeeding infant.

Fortunately, the typical American diet has been demonstrated repeatedly to be an adequate nutritional resource to support breastfeeding. Rather, the problem in this country is the generational loss of the art of breastfeeding (Lawrence, 1991).

Breastfeeding Attrition

Unplanned breastfeeding attrition is a common problem, which crosses cultural and socioeconomic boundaries. More than a decade ago, the American Academy of Pediatrics (1982) recommended that infants should be breastfed for the first four to six months of life. More recently, in Healthy People 2000, the U. S. Department of Health and Human Services,

Public health Service, set goals to increase breastfeeding in the early postpartum period to 75% and to increase breastfeeding duration until the infants are 5-6 months of age to 50% (1992). Despite these straightforward recommendations, early breastfeeding attrition remains high (Cooper, Murray and Stein, 1993; Lawson and Tulloch, 1995; Lindenberg, Artola, and Estrada, 1990).

Breastfeeding difficulties include the inability to initiate and maintain nursing as a result of physiological, psychosocial, or technical problems, e. g., latch-on, nipple pain, engorgement, leaking, decreased frequency (Dignam, 1995; Hill and Humenick, 1993; Hill, Humenick, and West, 1994; Jankin, Blythe, Campbell, and Carter, 1995; Morse and Bottorff, 1989; Winberg, 1995; Yamauchi and Yamanouche, 1990). Some investigators have concluded that early supplementation and pacifier use contributed to early breastfeeding problems (Kurinij and Shiono, 1991; Snell, Krantz, Keeton, Delgado, and Peckham, 1992; Victora, Tomasi, Olinto, and Barros, 1993). Based on similar research findings and empirical data, Neifert, Lawrence, and Seacat (1995) defined nipple confusion as suckling difficulties, which occur after a newborn has been introduced to an artificial teat. Avoiding the use of pacifiers and artificial nipples is an integral component of the World Health Organization/UNICEF Baby Friendly Hospital Initiative, which is a world-wide campaign aimed at removing obstacles to breastfeeding initiation in the immediate postpartum period (1989). Wright, Rice, and Wells (1996) found that changing hospital practices to reflect the "Ten Steps to Successful Breastfeeding", augmented by patient and staff breastfeeding education, positively influenced breastfeeding duration. Despite research findings, expert opinion, and a global campaign, the use of artificial nipples in the early postpartum period is still frequently seen as accepted postpartum hospital practice (Powers, Naylor, and Wester, 1994).

Many breastfeeding mothers wean prematurely within the first few postpartum weeks, secondary to early problems associated with lactation initiation and maintenance. Matthews (1993) examined the effect of hospital postpartum experiences on breastfeeding duration at six weeks postpartum. She found that 16 of 25 mothers (64%) had not developed a consistently good feeding pattern by hospital discharge, and subsequently had weaned their infants by two weeks of age.

Insufficient milk supply. Frequently, insufficient milk is the reason mothers cite for early termination of breastfeeding (Bagwell, Kendrick, Stitt, Leeper, Espy, and Gedel,1992; Graffy, 1992; Hill, Humenick and West, 1994; Humenick, Hill, and Anderson, 1994; Isabella and Isabella, 1994; Janke, 1993; Kearney, Cronewett, and Barrett, 1990; Mogan, 1986). Hill and Humenick (1989) were among the first to identify the phenomenon, insufficient milk supply. Subsequently, Humenick and Hill (1995) proposed a conceptual framework, which provided a description of the phenomenon, insufficient milk supply, the complex physiological and psychosocial causes of insufficient milk supply, and nursing intervention strategies. In a Scandinavian study, Hillervik-Lindquist (1991) found that in a group of 51 women reporting insufficient milk supply, 45 per cent were caused by emotional disturbances in the mother such as anxiety, stress, and discomfort, and 24 per cent by infant problems such as illness, refusal to suckle, and fussiness. They concluded that some of the common psychosocial stresses related to breastfeeding were significant enough to some women to warrant weaning.

Hill and Aldag (1991) reported in their research on insufficient milk supply, that mothers who had less confidence and less knowledge about breastfeeding were more likely to report symptoms consistent with insufficient milk supply syndrome. They also found that infant birth weight, maternal confidence, paternal support, and mother-in-law disapproval were significant factors in early supplementation or weaning. In a more recent study, Hill and Aldag (1993)

found that there were no differences in insufficient milk supply between African-American and Caucasian women with a similar socioeconomic background.

Characteristics of breastfeeding women. Breastfeeding is an intimate process that requires psychological preparation as well as technical skill. Sources from several disciplines (Baranowski, Rassin, Richardson, Brown, and Bee, 1986; Janke, 1993; Kearney, 1988; R. A. Lawrence, 1989) have reported that personality, personal and cultural attitudes, and varying emotional states have measurable influence on the women who choose to breastfeed. The naturalness of breastfeeding, development of a close maternal-child bond, as well as unconscious motivations help define women who breastfeed (Bottorff, 1990; Morse and Bottorff, 1988; Hills-Bonczk, Tromiczak, Avery, Potter, Savik, and Duckett, 1994; Locklin and Naber, 1993; Wrigley and Hutchinson, 1990). Although bonding, attachment, and breastfeeding are often linked together in the literature, research has not supported a difference in bonding and/or attachment between women who choose to breastfeed and women who choose to bottle-feed (Martone and Nash, 1987). Women may experience a variety of psychological concerns when they consider breastfeeding their infant. Feelings of incompetence, anxiety about milk production, and embarrassment about exposing the breasts are examples of these concerns. Breastfeeding success is believed to be dependent on multiple factors relating to the mother, the infant and the supporting environment (Driscoll, 1992; Laufer, 1990; Winberg, 1995). While some factors that influence breastfeeding cannot be changed, there are factors conducive to the duration of breastfeeding which are easily identifiable and have been reported frequently in the breastfeeding literature.

Attribute variables. Numerous studies (Cronenwett, Kearney, Barrett, Covington, Del-Monte, Reinhardt, and Rippe, 1992; Ford and Labbok, 1990; Hill, 1991; C. R. Howard, F. M. Howard, and Weitzman, 1994; Kurinij and Shiono, 1991; Martone and Nash, 1988) have identified those who breastfeed and those who bottle-feed with particular focus on initiation, duration, infant benefits, and female profile. There are several variables identifying women who

are more likely to breastfeed. Many of the variables are attribute variables and may not lend themselves to easy intervention. The attribute variables include women who are Caucasian, middle to upper class, well-educated, married, twenty to thirty plus years old; have previous successful breastfeeding experience; and were breastfed as infants (Ellerbee, Atterbury, & West, 1989; Feinstein, Berkelhamer, Gruszha, Wong, and Carey, 1986; Freed, Jones, and Fraley, 1992; Janke, 1993). Other variables positively associated with breastfeeding are planned pregnancy, early initiation of first feed, minimal formula supplementation, intended length of breastfeeding, and positive attitude (Barnes, Leggett, and Durham, 1993; Kurinij and Shiono, 1991; Lawson and Tulloch, 1995; Quarles, P. D Williams, Hoyle, Brimeyer, and A. R. Williams, 1994). These nonattribute variables help paint a picture of the woman who is more likely to breastfeed. However, many of these variables are not amenable to change or intervention.

For health care providers to assist in decreasing early attrition, prediction of early weaning must be based on variables that are amenable to change. A clinician's ability to promote breastfeeding would be greatly enhanced if there were sound interventions that help mothers find solutions for breastfeeding problems instead of undesired weaning. Health care providers who are knowledgeable about breastfeeding are in an opportune position to educate women prenatally about the benefits of breastfeeding and to offer current breastfeeding management strategies and support postnatally.

Modifiable predictors. Even though most of the known predictors of breastfeeding attrition are nonmodifiable variables, there are some that have been identified that are amenable to change. These include: 1) maternal attitude and breastfeeding satisfaction (Leff, Jefferis, and Gagne, 1994), 2) lack of social support from family and health professionals (Isabella and Isabella, 1994), and 3) lack of knowledge and skills to breastfeed (Richardson and Champion,

1992; Sciacca, Dube, Phipps, and Ratliff, 1995). These predictors closely parallel the Theory of Planned Behavior's (Ajzen, 1991) constructs of attitude (beliefs and feelings), social norm (support), and perceived control (knowledge, skills, and confidence). The modifiable nature of this theory makes it well suited to study breastfeeding.

Prenatal intent. Research in other domains has found that intention to perform an act is the most powerful predictor of subsequent behavior (Fishbein and Azjen, 1975). Coreil and Murphy (1988) conducted a longitudinal study of 44 breastfeeding women to determine how strongly prenatal intention influenced breastfeeding duration. Data were collected in the third trimester of pregnancy, immediately prior to delivery, and 4-6 weeks postpartum. Coreil and Murphy found the strongest predictor of breastfeeding duration was prenatal intent ($F = 12.78$, $p < 0.001$). Kessler, Carlson, Diener-West, and Paige (1995) interviewed 133 women and their significant others. The women were interviewed during their third trimester of pregnancy and again at 7-10 days postpartum. The woman's significant other (71% baby's father and 29% baby's maternal grandmother) was interviewed during the women's third trimester of pregnancy. Results indicated a woman's intention to breastfeed was strongly and positively affected by the significant others' feeding preference.

If behavioral intent is an important determinant of actual behavior, it is important to determine when mothers make their feeding choice. Many studies indicate that mothers choosing to breastfeed decide before pregnancy or by the end of the first trimester of pregnancy (Aberman and Kirchhoff, 1985; Buxton, Gielen, Faden, Brown, Paige, and Chwalow, 1991; Dix, 1991; Gulino and Sweeney, 1989; Halley, Bond, Crawley, Gregson, Philips, and Russell, 1984; O'Campo, Faden, Gielen, and Wang, 1992).

Maternal Attitude Toward Breastfeeding

Beliefs about the convenience, attractiveness, pleasure, and satisfaction of breastfeeding are perceived differently by breastfeeding and bottle-feeding women. Attitudes about the advantages and disadvantages of infant feeding methods arise from social, personal, and learned experiences. These attitudes may affect the woman's perceptions of the benefits breastfeeding can bestow, as well as the importance she places on breastfeeding (Losch, Dungy, Russell, and Dusdieker; 1995).

Attitude was identified as an important factor in the duration of breastfeeding over 40 years ago. In a classic study, Newton and Newton (1950) found that breastfeeding success was closely related to the mother's attitude toward breastfeeding. In a sample of 91 postpartum mothers, women were interviewed by the authors about their attitudes toward breastfeeding. The content of the interviews was found to possess positive or negative attitudes toward breastfeeding by two outside experts. The mothers who held positive attitudes toward breastfeeding nursed their infants more often and demonstrated more breastfeeding success than mothers who held negative attitudes toward breastfeeding. Newton and Newton also believed that attitude toward breastfeeding was not an isolated phenomenon. They reported that 22% of the women with negative breastfeeding attitudes expressed continued disappointment about the sex of their baby, and 43 % with negative attitudes reported extremely hard labors. Newton and Newton suggested that negative breastfeeding attitudes seem to be allied with other attitudes surrounding the birth experience.

Socioeconomic influences on attitudes. Several studies (Black, Blair, Jones, and DuRant, 1990; Libbus, 1992; Schwartz, Popkin, Tognetti, and Zohoori, 1995) investigated maternal attitudes toward breastfeeding among women of low socioeconomic status. In a survey of 120 maternal Women, Infant, and Children (WIC) participants, Black et al. (1990) found that

maternal attitude had a stronger relationship with feeding choice than social support or psychological influences ($p < 0.001$). Similarly, prenatal and follow-up postnatal interviews of 64 women of low socioeconomic status indicated mothers who elected to breastfeed differed significantly from women who elected to bottle-feed in their attitudes toward the importance of breastfeeding and nutritional superiority of breast milk over formula ($p<0.001$). Libbus (1992) examined attitudes and beliefs between two socially and culturally diverse groups, a La Leche League group (n=9) and a group of WIC participants (n=8). Although small sample size prohibits generalization of results, Libbus emphasized the importance of divergent attitudes and perceptions toward breastfeeding when planning educational and promotional breastfeeding interventions. In a retrospective study whose data base consisted of a national representation from the 1988 Maternal and Infant Health Survey (NMIHS), Schwartz et al. (1995) concluded that WIC participation combined with breastfeeding advice significantly increased the initiation of breastfeeding, but not the duration of breastfeeding.

Freed, Jones, and Schanler (1992) found that in their population of indigent women, negative attitudes toward breastfeeding were related to a lack of information about the protective properties of breastfeeding and the physiological purpose of the female breast. These findings are important because they indicate that beliefs and attitudes might possibly be more amenable to change through education than was previously thought. Gielen, Faden, O'Campo, and Paige (1992) investigated demographic and psychosocial factors that were important to a group of WIC mothers in formulating their attitude toward infant feeding choice. They found that women who used formula believed that formula feeding was more convenient and would give them more personal freedom. However, women who breastfed, believed that breastfeeding was more convenient, more natural, and healthier for their babies. Formula feeders were more likely to believe that breastfeeding would be embarrassing and would make them feel shy and awkward. Dix (1991) found in her study of postpartum WIC participants that women thought breastfeeding was better for the baby. However, the majority of women chose to bottle feed because of negative attitudes toward breastfeeding, conflicting responsibilities, inconvenience, negative

breastfeeding experiences, and personal health or medical problems. Despite the widespread recognition of the superiority of breastfeeding, women with a low socioeconomic status have a lower rate of breastfeeding and report more negative attitudes toward breastfeeding than women with an upper socioeconomic status (McLorg and Bryant 1989; Ford and Labbok, 1990).

Three studies (Baranowski Rassin, Richardson, Brown, and Bee, 1986; Ghaemi-Ahmadi, 1992; Yeo, Mulholland, Hirayama, and Breck, 1994) were found which examined cultural influence on breastfeeding attitudes. Yeo et al. (1994) compared the attitudes of high-school students in Japan and in the United States. They found that Japanese students believed that their mothers had a significantly more positive view toward breastfeeding than did American students ($p < .001$). Japanese students also felt that breastfeeding disturbs the family less than did American students. Overall the Japanese students had a much more positive attitude toward breastfeeding than American students.

In a study of African-American, Mexican-American, and Anglo-American women, Baranowski et al. (1986) found breastfeeding attitudes varied among ethnic groups. Infant benefits and personal inconvenience were most predictive attitudinal factors for African-Americans and Anglo-Americans. Personal inconvenience alone was most predictive for Mexican-Americans. Ghaemi-Ahmadi (1992) reported significant differences in breastfeeding attitudes among maternal immigrants from the Middle East and Southeast Asia. In her sample of 150 participants, 135 (95%) had exclusively breastfed children which were born in their native country. After immigration, 48 (32%) exclusively breastfed greater than five months, 57 (38%) used a combination of breastfeeding and formula feeding, and 45 (30%) exclusively used formula feedings. Comparisons among the three groups revealed positive attitudes in the exclusive breastfeeding group related to the protective benefit and perceived closer relationship of breastfeeding were statistically significant when compared with the other two groups ($p< 0.05$).

Richardson and Champion (1992) compared the relationship of attitudes, social support and knowledge to length of breastfeeding among a group of 102 primarily Caucasian, educated

women with an average age of 29 years. They found a positive attitudinal score on their Benefits and Barriers Scale was significantly related to longer breastfeeding duration ($r = .37$, $p < .001$). Four of the attitudinal items relating to breastfeeding being natural, less difficult, emotionally satisfying, and perceived social support from partner were significantly associated with breastfeeding duration.

In an early study, Berger and Winter (1980) investigated the knowledge and attitude of 290 public high school students. They found that 97.5% believed that breastfeeding was a desirable method of infant feeding, but 62.4 % did not know the advantages to the infant and/or emotional links of breastfeeding with the mother. A later study, using a modification of the Berger and Winter questionnaire, found that despite the fact that many mothers knew breastfeeding was preferable to formula-feeding, they still chose to formula-feed because they saw breastfeeding as cumbersome and restrictive (Arafat, Allen, and Fox, 1981).

Maternal and infant satisfaction related to breastfeeding. Humenick and Van Steenkiste (1983) were among the first investigators to examine a method, which would identify early breastfeeding attrition occurring within the first eight weeks postpartum. The authors used a strategy, which included in-hospital counseling, a 6-day follow-up phone call, and well child office visits at 2 and 8 weeks postpartum. When weaning data collected on postpartum day 6 and 14 were compared to weaning data at 8 weeks, low breastfeeding satisfaction and number of breastfeeding problems were significant factors of early weaning ($p < 0.05$). They concluded women who were not satisfied with breastfeeding and/or who had several breastfeeding problems were at high risk for weaning within the first two weeks postpartum.

Jones (1986) interviewed breastfeeding mothers before hospital discharge and again one year later to examine attitudes toward breastfeeding which were assessed in terms of satisfaction with their breastfeeding experience. The degree of satisfaction was strongly associated with mothers reporting few breastfeeding problems ($p < 0.0005$). Likewise, women who had problems with sore nipples and/or latch-on problems reported low satisfaction. The relationship between duration and satisfaction was very significant ($p < 0.0005$). On the contrary, fifty

percent of women who did not find breastfeeding satisfying had weaned within 2 weeks postpartum.

In more recent studies, Matthews (1991) investigated the relationship between neonatal feeding behaviors and maternal satisfaction with breastfeeding. Subjects assessed their neonates' feeding behaviors and checked their degree of breastfeeding satisfaction at every feeding. The results indicated that primiparous mothers had a significantly higher percentage of feedings at which the mothers experienced some dissatisfaction with their neonates' feeding behavior ($r = .673$, $p < .001$).

Developed from qualitative research, Leff, Gagne, and Jefferis (1994) developed an instrument, the Maternal Breastfeeding Evaluation Scale, to measure aspects of breastfeeding that women have identified as being important in defining successful breastfeeding. Their comparative analysis revealed five major categories that supported successful breastfeeding. Two of the most important categories were infant satisfaction and maternal enjoyment and satisfaction. Other categories included infant health, desired maternal role attainment, and lifestyle compatibility. They suggested that breastfeeding must be satisfying to both mother and child and a mother's perception of her infant's satisfaction is just as important as her own satisfaction. Further validity and reliability testing of this tool supported its use in clinical practice (Riordan, Woodley, and Heaton, 1994).

Attitude toward maternal employment. Maternal employment is noted in the literature to have varying effects on maternal attitude and satisfaction with breastfeeding (Auerbach, 1990; Bagwell et al., 1992; Duckett, 1992). Ekwo, Dusdieker, Booth, and Seals (1991) found that maternal perceptions of difficulties with breastfeeding when returning to work was one of the primary factors that influenced the early attrition among working women. Women who worry about the demand breastfeeding may place on their time and energy, especially when planning to return to work, have been found to breastfeed for a shorter duration. Ryan and Martinez (1989) compared breastfeeding problems, outcomes, and satisfaction of married, well-educated, first-time mothers who returned to work within six months postpartum with a group of mothers with

similar characteristics who stayed at home. They found that although the mothers who returned to work breastfed for shorter duration, both groups had positive experiences and satisfaction with breastfeeding. Subsequently, Ryan, Wysong, Martinez, and Simon (1990) found that maternal employment had a large impact on the duration of exclusive breastfeeding. At four months postpartum, they found women who were employed had a higher probability of initiating partial breastfeeding compared with women who were not in the work force (43 vs. 19%, respectively). Morse, Bottorff, and Boman (1989) interviewed 61 urban Canadian mothers who intended to continue breastfeeding after returning to work. Participants revealed that they had to be highly motivated to breastfeed in order to make the elaborate plans, and backup plans, required to continue to breastfeed and work full-time. Morse, Harrison and Prowse (1985) interviewed a sample of thirty women who practiced minimal breastfeeding. These women did not pump or breastfeed during work time, but breastfed once or twice a day. These women felt positively about their choice because it provided breast milk nutrients and comfort for their infant, and avoided the necessity of complete resolution of breastfeeding.

Attitudes are deep-seated phenomena that affect a mother's choice of feeding method and her satisfaction with the experiences of breastfeeding. A new mother is especially vulnerable to intense internal conflict between her beliefs and her experiences, and between her beliefs and the expectations of significant others.

Social Norms Related To Breastfeeding

Social support has been identified as an important element for encouragement and success of breastfeeding. Ample literature has been generated about social support and its relationship to breastfeeding (Baranowski, Bee, Rasin, Richardson, Brown, Guenther, and Nader, 1983; Isabella and Isabella, 1994; Matich and Sims, 1992; Morse and Harrison, 1987). Women's breastfeeding success is influenced by the support she receives from her husband, significant others, family member, co-workers, and health care professionals. Persons who provide social support can act as a buffer for an individual who is experiencing a stressful or new situation. The literature clearly indicates that her initiation and duration of breastfeeding is closely linked to the

father's support, particularly in Anglo-American mothers (Baranowski et al., 1983; Freed and Fraley, 1993; Giugliani, Bronner, Caiaffa, Wogelhut, Witter, Perman, 1994; Kessler, Gielen, Diener-West, and Paige, 1995; Libbus and Kolostov, 1994; Littman, Medendorp, and Goldfarb, 1994; McClurg-Hitt and Olsen, 1994; Sears, 1992).

Partner support for breastfeeding. Giugliani et al. (1994) investigated fathers' breastfeeding knowledge and its relationship with paternal attitudes, beliefs, and experiences regarding breastfeeding. Fathers of 92 breastfed babies and fathers of 89 formula-fed infants participated in the study. Fathers of non-breastfed infants were found to be less knowledgeable concerning supportive measures for breastfeeding mothers (chi-square = 16.07, $p = 0.0006$). Fathers of breastfed infants had a better understanding of the advantages of breastfeeding for both mother and child and were more knowledgeable about breastfeeding physiology. The majority of fathers (both groups) believed breastfeeding is painful and prevention of sore nipples is not possible. Although knowledge does not necessarily guarantee change in attitude or behavior, the authors recommended that more attention on paternal prenatal education could result in more paternal support for breastfeeding.

Littman, Medendorp, and Goldfarb (1994) examined social factors, which determined a woman's intention to breastfeed. They found the father's strong approval of breastfeeding was associated with a high incidence of breastfeeding (98%), whereas a father's indifference toward breastfeeding was associated with a low breastfeeding incidence (26.9%) ($p < 0.001$). Freed, Fraley, and Schanler (1992) surveyed 268 men during the first session of their first childbirth education classes. Fifty-eight percent of the men reported that their partners were going to breastfeed. Men in the breastfeeding group were more likely to believe breastfeeding was better for baby (96% vs. 62%; $p < 0.0001$) and were more likely to desire their partner to breastfeed (90% vs. 13%; $p < 0.0001$). Conversely, men in the formula-feeding group were more likely to think breastfeeding was bad for breasts (52% vs. 22%; $p < 0.01$) and interfered with sex (72% vs. 24%; $p < 0.001$). The majority of both groups of men believed breastfeeding was unacceptable in public.

Matrich and Sims (1992) explored the sources, types and amounts of social support perceived by women during their third trimester of pregnancy and after three to four weeks of postpartum breastfeeding. Their results supported other studies, which found the baby's father to be the most important source of social support.

Gamble and Morse (1993) utilized a grounded theory, qualitative methodology to explore the experiences of fathers whose infants were breastfed. The investigators reported fathers believed they must delay or postpone the development of certain aspects of their father-child relationship because of disparities resulting from breastfeeding. Gamble and Morse labeled the process of paternal acceptance of these differences as postponing. Postponing consisted of four transitional phases, which led to the development of compensatory behaviors to promote a close relationship with his child during the breastfeeding period. The authors concluded fathers need more educational support to help them identify their role in the breastfeeding relationship and develop behaviors to encourage attachment with their infants. Since breastfeeding perpetuates an exclusive mother-infant relationship, others have recommended that fathers need education and support to foster the father-infant relationship (Jordan and Wall, 1990; 1993). Although paternal support is important to maternal breastfeeding initiation and duration, Freed, Fraley, and Schanler (1993) found women's prediction of partners' breastfeeding attitudes and opinions were inaccurate (32% incorrect), despite almost 90% of couples reporting they had discussed infant feeding plans with their respective spouses.

Isabella and Isabella (1994) examined the degree to which primiparous women's perceptions of various support systems were associated with successful lactation. They found that husbands and grandmothers provided the greatest degree of emotional and instrumental support, while health care providers gave more informational support for breastfeeding.

Buckner and Matsubara (1993) developed the Utilization of Support Network Questionnaire (USNQ) to determine how mothers utilize their network for successful breastfeeding. Within their sample of sixty breastfeeding mothers, they found lactation consultants were the most utilized resources for providing expert information and answering

questions, while husbands and close family members were important resources for personal facets of breastfeeding.

Contrary to most studies on the relationship of social norms to breastfeeding, Libbus (1992) found that women believed it was appropriate for a woman to choose to breastfeed in the face of opposition from her husband and her mother. This finding may have been affected by the social and cultural diversities in their sample of WIC participants and breastfeeding biases among La Leche League members.

Baranowski et al. (1983) found that the type of social support varied among ethnic groups. Among African-Americans, support from a close friend was important. In Mexican-American women, support from their mother was most important. Among Anglo-Americans, support from the male partner was most important. Similar results were reported by Matich and Sims (1992) who investigated social support for a primarily Caucasian sample of women in their third trimester of pregnancy and at four weeks of postpartum breastfeeding. They found that the baby's father was the most tangible support for intended breastfeeders. This same support system was still important at the four-week postpartum assessment.

Secondary sources of social support. In a cross-sectional study of 100 breastfeeding and 100 formula-feeding women, Giugliani et al. (1994) investigated the relationship between mothers' infant feeding decisions and health professionals' and nonprofessionals' support for their respective decisions. Partner support was the most important factor associated with breastfeeding (odds ratio = 32.8). Prenatal class attendance and support from lay people improved the incidence of breastfeeding. These results support the belief about infant feeding decisions being a function of familial and group attitudes.

McNatt and Freston (1992) used the Hughes Breastfeeding Support Scale (HBBS) to measure a breastfeeding woman's social support network. This scale was developed to measure emotional, instrumental, and informational support offered by family, friends, and health professionals to breastfeeding mothers. Although the investigators found no significant differences between perceived support scores of women who saw themselves as successful

breastfeeders and those who saw themselves as unsuccessful breastfeeders, there was a significant correlation between health care provider support and information support. While this correlation might be expected, it is important for health care providers to realize the importance of maintaining current and accurate breastfeeding knowledge.

Kistin, Abramson, and Dublin (1994) examined the effect of peer counselors on breastfeeding initiation and duration of breastfeeding among low-income urban women. The peer counselors, who all received breastfeeding education and were supervised by a lactation consultant, were found to significantly improve breastfeeding initiation and duration. This study suggests that social support can come from sources other than family, friends and health professionals.

Health care providers' attitude and knowledge. Although health care providers have not been found to provide a significant part of the support for breastfeeding, their knowledge and attitude toward breastfeeding can have an impact on the mother, particularly in the prenatal period (Danner, 1991; Dix, 1991; Goldstein and Freed, 1993; Gulino and Sweeney, 1989; Lazzaro, Anderson, and Auld, 1995; Williams and Pan, 1994). McNatt and Freston (1992) found no significant difference in success in their breastfeeding experience between mothers who received support from a significant other and mothers who did not. However, they did find that the informational support provided by health care providers was related to a positive perception of breastfeeding. Mogan (1986) also found that health care professional advice could possibly increase the duration of breastfeeding. In this study, the problems and concerns of breastfeeding mothers were followed during the first six months postpartum. Common problems included the establishment of a satisfactory breastfeeding routine, introduction of solid foods, and management of work and breastfeeding. This research suggested that these concerns are amenable to assistance from health care professionals. However, Dix (1991) found that, even though most women received early and comprehensive prenatal care, the influence of health care providers on infant feeding choice was minimal.

Even though a health professional's input has not shown a significant difference in a woman's initiation and duration of breastfeeding, health professionals are in a position to provide accurate information to women so that they can make informed decisions. Health care providers need to possess a working knowledge about breastfeeding and to be aware of personal attitudes that they overtly or covertly convey to women (Lewinski, 1992; R. A. Lawrence, 1993; Naylor, Creer, Woodard-Lopez, and Dixon, 1994). In an early study, R. A. Lawrence (1982) found that 72% of obstetricians and 92% of pediatricians advocated breastfeeding as the preferred method of infant feeding. However, 86% of pediatricians stated that they recommended formula supplementation sometimes or always and 34 % of the health care professionals never initiated the topic of breastfeeding with the mother. Studies on knowledge levels of health care providers have found an alarming lack of knowledge among both physicians and nurses (Bagwell, Kendrick, Stitt, and Leeper, 1993; Driscoll, 1992; Freed, Clark, Curtis, and Sorenson, 1995; Freed, Clark, Soreson, Lohr, Cefalo, and Curtis, 1995; Freed, Jones, and Fraley, 1992). Since the literature points out a severe lack of knowledge among health professionals who care for women and children, it is possible that a general increase in health care professionals' breastfeeding knowledge might influence women's initiation and duration of breastfeeding (Donnelly, 1994).

Control Factors Related to Breastfeeding

Control reflects the perceived ability individuals have over their intention to perform a behavior. Ajzen (1991) suggested internal and external barriers that influence the degree of control individuals exert over their behavior. In breastfeeding, internal barriers include lack of information or skills about breastfeeding as well as a personal lack of confidence in one's ability to breastfeed. The most important external barriers in this study are lack of opportunity to breastfeed and limited availability of resources to overcome breastfeeding problems.

Although confidence is less tangible, Kemberling (1979) believed it was the single most influential factor in a woman's breastfeeding success. Duckett, Henley and Garvis (1993) found that mothers who are anxious, nervous, lack confidence, use formula soon after delivery, and

have an inadequate support system were more likely to wean their babies early. Loughlin, Clapp-Chaning, Gehlbach, Pollard, and McCutchen (1985) investigated the relationship between various maternal and infant characteristics and the frequency of cessation of breastfeeding during the first two months postpartum. They found that a mother's lack of self-confidence in her ability to breastfeed was a strong indicator of the early attrition of breastfeeding ($p < .001$).

Buxton et al. (1991) conducted prenatal and postnatal interviews with women who intended to breastfeed. Their interviews revealed four predictor variables that identified women who did not breastfeed for more than seven days. These factors were low confidence, less certainty in the decision, delayed first breastfeeding experience, and lack of rooming-in with the baby.

Although higher education level was frequently associated with increased breastfeeding duration, few studies have assessed maternal breastfeeding knowledge. Rentschler (1991) explored the relationship of breastfeeding knowledge and motivation to breastfeeding success. An assessment of 150 pregnant women's breastfeeding knowledge was compared to breastfeeding success (six weeks duration). She found a significant correlation between maternal knowledge scores and breastfeeding success ($rpb = .17$, $p < 0.0001$). Rentchler noted unsuccessful mothers lacked knowledge in areas regarding breast changes, maintenance of milk supply, nipple care, and engorgement. These findings are noteworthy since many women stop breastfeeding due to insufficient milk and sore nipples. Similarly, Bergh (1993) found that breastfeeding women cited insufficient motivation and inadequate breastfeeding knowledge as the two most frequent obstacles to breastfeeding success. Conversely, other studies have found no relationship between breastfeeding knowledge and breastfeeding duration (Richardson and Champion, 1992) or breastfeeding confidence and breastfeeding success (Lawson and Tulloch, 1995).

Prenatal education programs designed to enhance breastfeeding knowledge provide conflicting results (Geden, Beck, Brouder, Glaister, and Pohlman, 1985; O'Meary, 1993; Sturrock and Johnson, 1990). Wiles (1984) found primiparous mothers who attended prenatal

breastfeeding classes had greater perceptions of breastfeeding success than mothers who did not attend these classes ($p = 0.001$). Similar results were found in a study, which examined the effects of two types of prenatal education programs on breastfeeding initiation time immediately postpartum. In their sample, consisting of African-American urban women with low-incomes, higher percentages of breastfeeding initiation were found in the intervention groups (prenatal classes (46%) and individual instructional sessions (53%) vs. a control group (22%). However, other studies have found no difference in breastfeeding duration or perception of success between mothers who did and did not attend prenatal breastfeeding classes (Hill, 1987; Nidodem, Hofmeyr, Kramer, and Gulmezoglu, 1993).

The results of quasi-experimental studies can be examined to determine the effectiveness of professional and nonprofessional support on breastfeeding outcome. Kisten, Abramson and Dublen (1994) assigned peer counselors to breastfeeding women in one group ($N = 59$). This group was compared to a control group, which consisted of a group of breastfeeding women who had not been assigned peer counselors ($N = 43$). Peer counselors attended an eight-week breastfeeding course conducted by a registered nurse certified in lactation. Women in the counselor group had significantly greater ($p < .05$) breastfeeding initiation, exclusivity, and duration (mean of 15 weeks vs. mean of 8 weeks). In an earlier study, Jones and West (1985) also found that a lactation nurse who provided breastfeeding assistance during the postpartum hospital stay and made a two week postpartum home visit could have a positive influence on increasing breastfeeding duration.

Brent, Redd, Dworetz, D'Amico, and Greenburg (1995) randomly assigned 108 women into two groups. The intervention group received prenatal and postnatal lactation instruction from a lactation consultant. The instruction consisted of individual prenatal consultation, daily postpartum rounds by the lactation consultant, and outpatient follow-up at 48 hours after discharge, one week postpartum, and at each subsequent well baby visit until one year of age. Brent et al. found a significantly higher incidence of breastfeeding in the intervention group, as

compared with the control group (61% vs. 32%, $p = 0.002$). The duration of breastfeeding was also significantly longer in the intervention group ($p = .005$).

However, not all intervention studies yielded positive results. Grossman, Harter, Sachs, and Amparo (1990) investigated the effectiveness of a similarly intensive postpartum lactation support program for low-income breastfeeding women. When contacted at six weeks postpartum, the randomized study revealed no differences in breastfeeding duration between the intervention group and the control group. Similarly, Lynch, Koch, Hislop, and Coldman (1986) found no difference in an experimental group and a control group in which the experimental group was visited by a lactation nurse within five days of hospital discharge. The experimental group also received telephone calls every week during the first month and monthly during the second to sixth months of the study. The investigators found no statistically significant difference between the two groups in regards to breastfeeding duration or breastfeeding knowledge.

Thus, effectiveness of various types of professional support for breastfeeding is unknown. Many interventions have been developed with little or no theoretical support. Prenatal classes appear to be based on the notion that informational types of support have a positive effect on breastfeeding. Other types of intervention studies (Bono, 1992; Chen, M. C., Chen, W., Su, Wu, Chang, Lin, and Wu, 1995; Gilhooly and Helling, 1992; Simon, Johnson, and Liese, 1988) designed to influence breastfeeding tend to be anecdotal, lack power analysis, use small sample sizes, or lack a stated theoretical framework.

Summary

Breastfeeding is known to provide many benefits to both mother and child. However, breastfeeding is an emotional subject in which the mere mention of the word can evoke strong responses, particularly from women. These emotions are often influenced by very complex sociological, cultural, and psychological influences surrounding breastfeeding. Women who choose to breastfeed are often torn between their desire to breastfeed and the other loyalties, commitments, and responsibilities of daily life. Even though breastfeeding is supported as the

feeding method of choice for infants, breastfeeding does not have a unanimously positive perception and is not viewed with equal importance throughout this country.

This chapter has presented a summary of breastfeeding research, including nutritional properties, trends in the incidence and duration of breastfeeding, and the modifiable and nonmodifiable factors related to breastfeeding. The literature review found that erroneous breastfeeding beliefs, unavailable or nonsupportive social networks, and lack of breastfeeding skills and confidence were modifiable factors associated with breastfeeding behavior. Since many of the factors related to positive breastfeeding experiences are nonmodifiable factors, e.g., age, education, socioeconomic status, parity, it is importance for intervention studies to focus on factors which are amenable to change.

Breastfeeding is often abruptly terminated in the early postpartum period. Interventions are frequently designed to intervene prenatally or during the brief hospital stay, without continuation of professional support after discharge and without a stated theoretical framework. Interventions demonstrated to support breastfeeding from delivery through the first few weeks postpartum are essential to advancing an effective approach aimed at decreasing unplanned attrition. A successful breastfeeding experience builds up a mother's confidence and self-esteem, and facilitates acquisition of the maternal role. Unplanned early attrition of breastfeeding may bring a high emotional price if a mother is left with feelings of failure or lack of self-confidence.

CHAPTER III

Methodology

Early breastfeeding attrition is a nationwide nutritional problem in infancy. Although research has clearly shown that breast milk is superior in content over formula, the breastfeeding attrition rate in this country remains high. Many infants are weaned prematurely within the first two weeks of life, secondarily to a lack of breastfeeding knowledge, maternal and infant breastfeeding dissatisfaction, and lack of support from significant others as well as health care professionals (Matthew, 1993). Pediatric health care professionals are challenged to develop strategies that will provide support to breastfeeding mothers and decrease breastfeeding attrition.

The purpose of this study was to determine if a model-based intervention developed from the Theory of Planned Behavior (TPB) was effective in decreasing breastfeeding attrition. The intervention consisted of an in-hospital postpartum visit, a home visit two to four days after discharge, and a follow-up phone call 10 to 14 days after the home visit. This study also explored two quantitative breast milk measures for potential usefulness in a clinical setting. A third measure, lipid extraction, was used for standardization purposes.

Study Design

Hypotheses 1-3: This quasi-experimental study required a convenience sample of 132 breastfeeding women (66 in the experimental group and 66 in the control group) recruited from the postpartum units at Wilford Hall Medical Center (WHMC). This medical treatment facility is a 1000 bed tertiary hospital for the active and retired military population in the San Antonio area and a referral center for the Department of Defense. There are approximately 150 deliveries per month at this facility. Primiparous women constitute approximately one-third of the deliveries.

The sample size was based on a power analysis giving an alpha of .05, a power of .80, and an effect size of .25. It was estimated that 150 subjects were needed to obtain the desired sample size. The following inclusion criteria were established for all potential subjects for this study: (1) 18 years or older, (2) primipara, (3) delivery of a healthy term infant, (37 weeks gestation, 2500 grams), (4) an uncomplicated delivery and postpartum course, and (5) anticipated breastfeeding for a minimum of six weeks. Exclusion criteria included: 1) multiparity, 2) maternal illness, 3) sick neonate, 4) postpartum (infant and /or mother) hospitalization greater than 4 days, and 5) non-English speaking mothers.

The investigator reviewed inpatient maternity and newborn for mothers and infants who met the first three criteria items. The fourth criterion, anticipated breastfeeding duration, was determined by subject interview. The study was explained to potential subjects. Written consent was obtained in accordance with the respective institutions', Wilford Hall Medical Center and the University of Texas Health Science Center at San Antonio, Institutional Review Board (IRB) procedures. Institutional Review Board approval was obtained from both institutions. A copy of the consent was given to each subject. Subjects were randomly assigned by groups of ten. Subjects with even numbers were assigned to the intervention group; subjects with odd numbers were assigned to the control group. All subjects were asked to complete a demographic data form.

Data Collection and Measurement

The following procedures and protocols were used with the intervention group only. The postpartum visit was conducted in the mother's room. The investigator began the visit by asking an open-ended question concerning the progress of initial breastfeeding attempts and discussion of these concerns. Other potential occurrences regarding breast discomfort, milk production,

breastfeeding technique problems, jaundice, supplementation, infant activity, and plans for discharge were discussed with each mother (see Procedures for Postpartum Visit Appendix A). Permission was requested from each mother to observe her breastfeeding to assess her techniques (positioning and latch-on) and to offer suggestions if indicated. Each postpartum visit lasted approximately 30 minutes. An appointment for the home visit, 2-4 days after discharge was made at the end of the postpartum visit. The date of the home visit was guided by the principal investigator's assessment of the mother-baby interaction and the mother's preference.

The home visit provided an opportunity to assess the mother-infant breastfeeding interaction in their natural setting without the hospital support environment. The investigator elicited follow-up on problems that occurred during the postpartum period, and inquired about any new maternal concerns. The home visit was guided by the Procedure for Home Visit (see Appendix A) which addressed concerns discussed at the postpartum visit, as well as maternal support issues in the home, mother's diet, breast pumping and storage, and the availability of outside breastfeeding resources. A breastfeeding assessment and a breast milk maturation test were planned for each home visit. The breastfeeding assessment consisted of an observation of latch-on, positioning of mother and infant, and infant suckling. The duration of each home visit was approximately 45-60 minutes. An appointment was made for the follow-up phone call at the end of the home visit.

The phone call was made10-14 days after the home visit. The phone call provided the opportunity to follow-up on previous concerns and to inquire about new occurrences. The phone call was guided by the Procedure for Follow-up Phone Call (see Appendix A), which covered questions from the postpartum visit and the home visit. In addition, other areas addressed during the phone call were mastitis, breastfeeding in public, and returning to work.

This concluded the intervention part of the study. Mothers were reminded that the final phase of the study would be completed at their six-week postpartum visit. If the six-week postpartum visit was missed, the questionnaires (with return envelope and postage enclosed) were mailed to the participant's home. Return was requested within 10 days.

The Breastfeeding Protocol (Appendix B) was used to guide all three interactions: the postpartum visit, the home visit, and the follow-up phone call. The purpose of the protocol was to provide continuity for each visit. The protocol contained three parts: 1) the section on maternal attitudes toward breastfeeding, 2) the section on social norms influencing breastfeeding, and 3) the section on maternal perceived behavioral control regarding breastfeeding. The first part focused on maternal attitudes toward breastfeeding. The attitude section listed erroneous beliefs and misconceptions about breastfeeding, followed by interventions that the investigator used to help alleviate the erroneous beliefs and misconception. The second part of the protocol focused on maternal social norms regarding breastfeeding. The social norm section identified significant people that influenced the maternal decision to continue breastfeeding, followed by interventions that enhanced this support network. The third part focused on maternal perceived behavioral control concerning breastfeeding. The perceived behavioral control section listed common occurrences faced by breastfeeding women that may affect ability to breastfeed, followed by interventions that were designed to help the mother manage the occurrence with little or no interruption in breastfeeding. The Maturation Index of Colostrum and Milk (MICAM) (Humenick, 1987; Humenick et al. 1994) was used to assess the individual rate of breast milk maturity at the home visit. This test was used to offer women objective data as well as confidence concerning their milk maturation.

The effectiveness of the research-based intervention was evaluated by the following three tools designed to measure the intermediate outcomes: (1) Breastfeeding Attrition Assessment, (2) H & H Lactation Scale (attitude, satisfaction, control), and (3) Hughes Breastfeeding Support Scale (social norm) (Appendix C). These instruments measured the intermediate outcomes described by the theory of planned behavior, and therefore were appropriate to use in this theoretically based study. These scales were administered to both intervention and control groups at their six-week postpartum health care visit.

Control group. Other variables influenced breastfeeding attitudes, social norms, and perceived behavioral control. To determine if the model-based intervention based on the theory of planned behavior was the cause of changes, the investigator used a control group. The control group was enrolled during the postpartum hospital stay. This group received the routine postpartum care, but did not participate in the intervention. The control group was asked to complete the H & H Lactation Scale, Breastfeeding Attrition Assessment, and Hughes Breastfeeding Support Scale at their six-week postpartum visit.

A preliminary study conducted at Wilford Hall Medical Center, was used to determine the feasibility of the major study, to identify problems in the research design, and to refine the data collection and analysis plan. The preliminary study also provided the opportunity for the investigator to become familiar with the procedures and protocols developed for this study. No changes were made in the methodology as a result of the preliminary study. The instruments were found to be adequate measures of the study variables. Results from the preliminary study found no statistically significant differences between the two groups of breastfeeding women.

Instruments

The H & H Lactation Scale is a 20 item scale developed by Hill and Humenick (1996). It consisted of three subscales: 1) the Perceived Infant Breastfeeding Satiety Subscale (PIBSS), which was a five item scale reflecting the mother's perception of whether her infant found her milk supply to be adequate; 2) the Maternal-Infant Breastfeeding Satisfaction Subscale (MIBSS), which was a five item scale assessing the mother's perception of her own satisfaction as well as her baby's satisfaction with breastfeeding; 3) the Maternal Confidence/Commitment Breastfeeding Subscale (MCCBS) which was a 10 item scale, measuring the mother's confidence and commitment to breastfeeding. The mother used a forced choice seven point Likert scale (1 = strongly agree to 7 = strongly disagree) to describe how much she agreed or disagreed with each item on the scale. Adding all the ratings to obtain a score for each subscale was the scoring method used for this scale. Items 3, 8, 12, 13, 14, and 15 required transformation to reverse the scores. Missing data for any given item was replaced by the mean for that item.

For mothers who delivered term infants, the Cronbach's alpha coefficient for the entire scale ranged from .91 to .92. The individual scales ranged from .75 to .84 for the Confidence/Commitment subscale; .80 to .89 for the Satiety subscale; and .77 to .92 for the Satisfaction subscale. Test-retest correlations for the three subscales ranged from .68 to .90, .67 to .89, and .73 to .83, respectively.

The Breastfeeding Attrition Assessment was developed by the investigator to collect data on a mother's duration of breastfeeding. The assessment consists of six objective questions related to the extent of a mother's current breastfeeding and the reasons for supplementing formula and/or weaning. The tool also consists of five subjective questions related to mother's personal breastfeeding experiences.

The Hughes Breastfeeding Support Scale (HBSS) is an instrument developed by Hughes (1984) to measure three different types of breastfeeding social support that a mother received from her breastfeeding social support group. The instrument measures interactions, which conveyed caring, trust, and love, task oriented behaviors that assisted the breastfeeding mother, and behaviors that were directed to impart breastfeeding knowledge or information to the mother. The HBSS consists of 30 possible support measures that significant others offer to a breastfeeding mother. The mother used a forced choice four point Likert scale (1 = no help at all to 4 = as much help as I wanted) to describe the amount of help she received in each area. Adding the ratings for all the items to obtain a single social support score was the scoring method used for this scale. A score of 90 or higher was considered to be indicative of positive breastfeeding support.

The Cronbach's alpha reliability coefficient for the HBSS ranged from .84 to .88. Split half reliability was calculated using split half correlation of emotional, instrumental, and informational scores. The split half correlation's ranged from .74 to .80. The corrected split half reliability was calculated using the Spearman-Brown Prophecy, which raised the reliability scores to .85 to .89. Face validity was established from a panel of six experts in the pilot study.

The Maturation Index of Milk and Colostrum (MICAM), a biological marker to assess the individual breast milk maturity rate was developed by Humenick (1987); Humenick et al. (1994). The MICAM was developed to use as a screening tool to assess the progress of milk maturation when there was a concern about a delay in initiation of lactogenesis or to evaluate interventions designed to support breastfeeding. Humenick (1987) suggested that the biological foundation of the MICAM be based on the gradual breakdown of an emulsion of breast milk that was due to the changing ratio of sterols and phospholipids divided by the fat content of the milk. To perform the

test, one or two drops of fresh breast milk were dropped onto filter paper. Once the milk has dried, distinctive, sequential patterns of colostrum and milk can be observed. Humenick described the five patterns as follows: early colostrum dries hard and shiny and is either bright yellow or pale yellow. It was primarily seen in the first twelve hours post delivery. Late colostrum was similar to colostrum but had a thin translucent outer ring. Late colostrum was typically seen during the first 48 hours postpartum. Early transitional milk dried with three rings. The center ring was a shade of yellow and occupies 50% or more of the total area. The middle ring was white and the outer ring was translucent. It was commonly seen 36-120 hours after delivery. The late transitional milk had the same three rings as transitional milk. However, late transitional milk had a yellow center that was less than 50% of the total area. This pattern was nicknamed the "fried egg" pattern because of its appearance. It was usually seen by the fifth postpartum day. Mature milk had three rings, but the center ring was difficult to see because it was almost the same color as the middle ring. This pattern was the predominant pattern by day 14. The authors reported that refrigeration of the milk did not affect the test results. They recommended that the MICAM be read within 24 hours. A quantity of five milliliters was requested from each mother. Even though only two to three drops are required for the MICAM, the authors reported that breast milk samples of less than .05 milliliter produced questionable results. They hypothesized that a lack of a representative sample of milk caused the questionable results. Breast milk has considerable individual variability in the progression from one stage to another. Thus, the main benefit of this test was that it gave objective data for the individual progression of milk maturation at a given time in the milk maturation process.

Humenick et al. (1994) reported the test-retest reliability of the MICAM. Breast milk samples (foremilk, midmilk, and hindmilk) were collected from the same breastfeeding episode.

Foremilk and midmilk MICAM pattern agreement ranged from 72% to 80%. Midmilk and hindmilk MICAM pattern agreement ranged from 73% to 79%. Comparison of foremilk with hindmilk agreement rates ranged from 58% to 72%. Of all the disagreements within a feeding, 96% disagreed by only one MICAM pattern. Chi-square was used to perform test-retest reliability with samples from the first versus the second breast. No significant difference was found. Inter-rater reliability of the MICAM was established by giving 10 student nurses a written description of each MICAM pattern and then asking each student to rate 35 MICAM samples. They were given 30 minutes to practice rating and ask questions before rating the test samples. Correctness of scores ranged from 56% to 86%. Students were given additional training and a new set of samples, which resulted in a rise of correct scores to 76% to 100%. Five nurse researchers were also trained to identify MICAM patterns. The percent of correct scores ranged from 90% to 95%. Most of the error was found to be differentiating MICAM type 3 from MICAM type 5.

Construct validity was tested using breastfeeding initiation, frequency and cumulative duration of suckling, and infant suckling behaviors to predict breast milk maturation. Significant correlations were found between initiation and milk maturation on days 4, 7, and 10 ($r = -.17$ to.22; $p = .05$ to .021; $n = 80$ to 89; cumulative duration of suckling on days 3 through 6 and appearance of MICAM type 3 ($r = -.31$ to $-.40$; $p = .005$ to .001; $n = 61$ to 69); minutes at breast and first appearance of MICAM type 5 ($r = -.43$ to $-.47$; $p = .02$ .03; $n = 18$ to 21; infant suckling behavior first appearance of MICAM type 5 ($r = -.27$, $p = .02$; $n = 58$; first appearance of Type 3 and weight gain ($r = -.33$, $p = .003$, $n = 72$; maternal and infant satisfaction ($r = .20$ to 29; $p = .045$ to .007; $n = 71$ to 75; sustained breastfeeding and maturation rate chi-square 19, $p = .04$, $n = 75$).

Hypothesis 4: The investigation of quantitative measures as well as psychosocial measures were necessary to assist clinical nurses in developing breastfeeding protocols. Two methods have been proposed for analysis of breast milk in a clinical setting, the creamatocrit and the MICAM. Both were based on the fat content of milk which increased after birth from colostrum which is primarily a protein solution to mature milk which has a high fat content. Although both measures were investigated in the preliminary study, the MICAM was used as the clinical measure at the home visit.

The creamatocrit, introduced in the late 1970's, was a method of estimating the fat content of breast milk based on the centrifugation of human milk in standard capillary hematocrit tubes. Although not widely used in this country, the creamatocrit offered a simple means of analyzing milk fat when large numbers of samples must be analyzed and the amount of milk is small. To be used with confidence, the creamatocrit must be validated against a standard method of measuring lipid content. This was accomplished by comparing the creamatocrit to a classic method of lipid extraction. Dole's method of lipid extraction (1956) was recommended as the most efficient method of lipid extraction for this project (H. Bertrand, personal communication, December 14, 1995).

Study Procedures

Twenty samples (10 cc each) of breast milk were required for this project. Subjects were recruited from a local breastfeeding support group at The University of Texas Health Science Center at San Antonio (UTHSCSA) Employee Breastfeeding Support Group and from lactating women from the postpartum unit at Wilford Hall Medical Center (WHMC). The study was explained to each subject who agreed to participate. Written consent was obtained according to

the Wilford Hall Medical Center IRB and the University of Texas Health Science Center IRB informed consent procedures.

The following procedures were used for this project:

1. Subjects from UTHSCSA were asked to donate milk during their normal visits to the employee breast pump room. Subjects from WHMC postpartum unit were asked to donate milk when using the postpartum unit's electric pumps.
2. Subjects were asked to donate 10 cc at the end of a regular scheduled pumping session. This schedule provided consistency of collection and is believed to be the least disruptive to the subject.
3. Milk was placed in plastic containers and immediately chilled in a cooler.
4. The MICAM and creamatocrits were performed within four hours of collection.

Creamatocrit procedures. Creamatocrits were performed using standard hematocrit capillary tubes and Fowler calipers. From fresh untreated breast milk, approximately 0.75 ml was drawn into the capillary tubes. The tubes were sealed at one end with clay. The specimens were spun for fifteen minutes in a hematocrit centrifuge. Three creamatocrits were done on each milk sample. The cream was measured with Fowler calipers to the nearest one-thousandth inch. The height of the cream layer was divided by the total height of the milk sample, and thus, the cream content of the breast milk sample was expressed as a percentage. Since the direct creamatocrit did not represent the weight percentage of fat in the sample, a standard curve was established. This is accomplished by comparing the creamatocrit to the classic lipid extraction method.

Lipid extraction procedures. The initial portion of the lipid extraction mixture was initiated upon collection. In the laboratory, an additional 25 ml of Dole's mixture was added to make a 50 ml single phase system which was briefly and vigorously shaken. The singular phase

extraction system was allowed to sit for one hour before the system was disrupted with the addition of 30 ml of isooctane and 20 ml of water. After thoroughly shaking the mixture, the phases were allowed to separate and the upper phase was collected in a 50-ml volumetric flask and brought to volume with isooctane. This lipid extraction was completed in the Department of Physiology under the supervision of Dr. Helen Bertrand.

MICAM Procedures. To perform the MICAM, three drops of breast milk were dropped onto Whatman filter paper #1, which had been placed on a canning jar ring or petrie dish. Samples took up to 30 minutes to dry and were all read at 60 minutes. The breast milk samples dried, forming one of five distinctive patterns: early colostrum, late colostrum, early transitional milk, late transitional milk, and mature milk. Two MICAMS were done on each milk specimen on the same piece of filter paper. The MICAM was discussed in further detail in the instrumentation section of this chapter.

Data Analysis

The hypotheses formulated for this study were analyzed as follows:

Hypothesis 1: Women who participate in a breastfeeding intervention will be less likely to terminate breastfeeding at six weeks postpartum than women do not participate in the intervention.

Chi-square analysis was used to determine the differences in the frequency of breastfeeding attrition between women in the intervention and control groups.

Hypothesis 2: Women who participate in a breastfeeding intervention will have higher maternal satisfaction, social support, and control scores at six weeks postpartum than women who do not participate in the intervention.

This hypothesis was analyzed by t-tests. Independent t-tests were used to illustrate the relationships between the intervention group scores and control group scores for each of the intermediate outcomes, maternal satisfaction, social support, and maternal control.

Hypothesis 3: Collectively, the intermediate outcomes of maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding are better predictors of breastfeeding success than any alone.

A logistic regression model was used to determine which of the intermediate outcomes (maternal satisfaction, social support, and maternal control) were significantly influenced by a breastfeeding intervention.

Hypothesis 4: Fat content is an index of maturity of human breast milk.

Aim 1. To show that the creamatocrit can be a measure of the fat content of breast milk when fat content is greater than 10%.

Aim 2. To show that the MICAM, (Maturation Index of Colostrum and Milk), is a better index of the fat content of breast milk when the fat content is less than 5%.

A linear regression model was used to determine if the creamatocrit was a valid measure of breast milk fat. Further analysis, using Pearson *r*, correlated the creamatocrit results greater than 10% with the corresponding MICAM and creamatocrit results less than 5 % with the corresponding MICAM.

Limitations

1. The participants of this study are members of the armed services or dependents of members of the armed services, which makes it a socioeconomic and culturally homogeneous group. This will limit the generalizabilty of the study to more heterogeneous groups.

2. Women may change their attitudes toward breastfeeding, social norms influencing breastfeeding, and their perceived behavioral control regarding breastfeeding as a result of other intervening factors.

3. Women in the intervention group may elect to terminate their participation in the study if they do not believe that they are deriving a benefit from participating in the study or if they no longer desire to participate due to the prolonged data collection period.

Summary

This study was designed to determine if a research-based intervention, used in conjunction with a biological marker for breast milk maturation, was effective in decreasing breastfeeding attrition. This study also explored the usefulness of the MICAM in the clinical setting. The instruments used in this study were the Breastfeeding Attrition Assessment, H & H Lactation Scale, and the Hughes Breastfeeding Support Scale. Milk fat measures used in this study were lipid extraction, creamatocrit, and the MICAM. Data were analyzed using descriptive statistics, chi-square, t-tests, linear regression, and logistic regression.

CHAPTER IV

Results

The purpose of this quasi-experimental study was to determine if a model-based intervention developed from the theory of planned behavior was effective in decreasing breastfeeding attrition. The intervention consisted of an in-hospital postpartum visit, a home visit two to four days after discharge, and a follow-up phone call 10 to 14 days after the home visit. The effectiveness of the research-based intervention was evaluated by the following three tools designed to measure the outcome variables: (1) Breastfeeding Attrition Assessment, (2) H & H Lactation Scale (attitude/satisfaction, control), and (3) Hughes Breastfeeding Support Scale (social norm). These instruments measure the variables described by the theory of planned behavior, and therefore were appropriate to use in this theoretically based study.

The outcome instruments were completed at the woman's six-week postpartum visit. If contact was not made at the six week postpartum visit, the instruments were completed by mail. This study also explored two quantitative breast milk measures for potential usefulness in a clinical setting. A third measure, lipid extraction, was used for standardization purposes. Data were analyzed using descriptive statistics, chi-square, t-tests, and logistic regression.

Implementation of Major Study

Women who were asked to participate in this study had given birth to healthy term infants, spoke English fluently, were at least 18 years of age, and had planned to breastfeed a minimum of six weeks. This study used a randomly assigned convenience sample of 132 breastfeeding women (66 in the experimental group and 66 in the control group) recruited from the postpartum units at Wilford Hall Medical Center (WHMC). One hundred ninety-seven primiparous women were

invited to participate in this study; 15 declined to participate. Of those who desired not to participate in the study, three declined to express breast milk, two refused to sign the consent form, two declined to complete demographic or outcome questionnaires, five assigned to control group requested to be in intervention group, and three offered no reason.

Initially, random assignment was used to assign women to either the intervention group or the control group. Subjects with even numbers were assigned to the intervention group, and subjects with odd numbers were assigned to the control group. A disproportionate subject attrition rate in the control group created the necessity to enroll additional subjects, which created a discrepancy in the number of women enrolled in the intervention group (n = 79), and in the control group (n = 107).

Of the 107 women enrolled in the control group, outcome data were not obtained from 32 women. Fifteen of the 32 nonresponders were contacted by telephone regarding information on duration of breastfeeding only. Three women were still breastfeeding at six weeks postpartum. The remaining 12 women had weaned their babies prior to six weeks postpartum. Of the 107 women, breastfeeding attrition data were collected on 90 women. These subjects were contacted in an effort to help explain the breastfeeding attrition rate at six weeks postpartum. However, the additional data collected from the 15 women who were contacted by telephone also increased the discrepancy in the number of subjects within each group.

In the intervention group, five women were dropped from the study; three were eliminated due to infant illness (one required rehospitalization), and two were eliminated due to home visit schedule problems. Seventy-four women enrolled in the intervention group completed the intervention. Of these women, breastfeeding attrition data, which was defined as the termination of breastfeeding before six weeks postpartum, were collected from 68 women.

Descriptive Analysis of Subjects

The women ranged in age from 18 to 41 years with a mean age of 26 years in both groups. The majority of the participants were married (91.1%), Caucasian (62.7%), with average incomes between $20,000 to $40,000 income level (43.0%). Only two of the subjects reported having less than a high school education. Seven (4.4%) women had completed vocational or trade school, 52 (32.9%) had some college, 46 (29.1%) completed college, and 18 (11.4%) had graduate degrees. See Table 1 for detailed information on the sample group characteristics regarding race, marital status, income, and education.

Table 1
Demographic Characteristics of Sample

Demographic Trait	Intervention		Control		Total	
	N	%	N	%	N	%
Race						
White	42	61.8	57	63.3	99	62.7
Black	8	11.8	9	10.0	17	10.8
Hispanic	15	22.1	18	18.0	33	20.9
Asian	1	1.5	2	2.2	3	1.9
Other	2	2.9	4	4.4	6	3.8
Total	68	100.0	90	100.0	158	100.0
Marital Status						
Married	64	94.1	80	88.9	144	91.1
Single	4	5.9	10	11.1	14	8.9
Total	68	100.0	90	100.0	158	100.0
Income						
< $20,000	10	14.7	23	25.6	33	20.9
$20,000 - $39,999	29	42.6	40	44.4	69	43.0
$40,000 -$59,999	20	29.4	8	8.9	28	17.7
> $60,000	9	13.2	14	15.6	23	15.2
No answer			5	5.6	5	3.2
Total	68	100.0	90	100.0	158	100.0
Education						
Grade School	2	2.9	0	0.0	2	1.3
High school/GED	7	10.3	25	27.8	32	20.3
Vocational/trade	3	4.4	4	4.4	7	4.4
Some college	26	38.2	27	30.0	53	32.9
College graduate	23	33.8	23	25.6	46	29.1
Graduate degree	7	10.3	10	11.1	17	11.4
No answer			1	1.1	1	0.6
Total	68	100.0	90	100.0	158	100.0

Further analysis of preceding demographic variables was performed with the use of chi-square. A chi-square analysis of the Caucasian and the minority groups (African-American, Hispanic, Asian, and other) revealed no statistically significant difference in the racial composition between intervention and control groups (X^2 (1, $\underline{N}$ = 158) = .001, $\underline{p}$ > .05). These data are presented in Table 2.

Table 2

Chi-square of Caucasian and Minority Women by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
Caucasian	42	61.8	57	63.3	99	62.7
Minority	26	38.2	33	36.7	59	37.3
Total	68	100.0	90	100.0	158	100.0

Chi-square	DF	Significance
.001	1	.97

A chi-square of the married and single women revealed no statistical significance in the marital status between the two groups (X^2 (1, $\underline{N}$ = 158) = .744, $\underline{p}$ > .05). These data are presented in Table 3.

Table 3

Chi-square of the Women's Marital Status by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
Married	64	94.1	80	88.9	144	91.1
Single	4	5.9	10	11.1	14	8.9
Total	68	100.0	90	100.0	158	100.0

Chi-square	DF	Significance
.744	1	.39

A chi-square analysis of the women who had a high school education or below revealed a statistical significance between women in the intervention and control groups (X^2 (1, $\underline{N}$ = 158) = .4.176, $\underline{p} < .05$). Since a low educational level is associated with decreased breastfeeding duration, this finding suggested that women in the control group could potentially be at greater risk for weaning. These data are presented in Table 4.

Table 4

Chi-square of Women who had a High School Education or Below by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
HS or above	59	86.8	64	71.9	123	78.3
HS or below	9	13.2	25	28.1	34	21.7
Total	68	100.0	90	100.0	158	100.0

Chi-square	DF	Significance
* 4.176	1	.04

A chi-square analysis of the women with income levels below $20,000 indicated that there was no statistical significance between the two groups (X^2 (1, N = 158) = 2.142, p > .05). These data are presented in Table 5.

Table 5

Chi-square of Women with Income Less than $20,000 by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
Greater than $20T	58	85.3	67	74.4	125	79.1
Less than $20T	10	14.7	23	25.6	33	20.9
Total	68	100.0	90	100.0	158	100.0

Chi-square	DF	Significance
2.142	1	.143

The majority of women in the intervention and control groups (92.6%, 86.7%, respectively) were married to the baby's father and both lived in same household. Only one woman, who was in the intervention group, reported that the baby's father was not involved with their infant (Table 6).

Table 6

Relationship with Baby's Father

Relationship Description	Intervention		Control		Total	
	N	%	N	%	N	%
Married, live together	63	92.6	78	86.7	141	89.2
Not married, live together	0	0.0	3	3.3	3	1.9
Married, live apart, involved with baby	1	1.5	2	2.2	3	1.9
Not married, involved, lives elsewhere	3	4.4	7	7.8	10	6.3
Father not involved	1	1.5	0	0.0	1	0.6
Total	68	100.0	90	100.0	168	100.0

One hundred fifty-eight women (98.7%) reported that the baby's father supported their decision to breastfeed. Only three women in the intervention group and one woman in the control group did not know if the babies' fathers supported their decision to breastfeed (Table 7).

Table 7

Maternal Perception of Father's Support for Breastfeeding Decision

Support description	Intervention		Control		Total	
	N	%	N	%	N	%
Father supportive	67	98.5	89	98.9	156	98.7
Father not supportive	0	0.0	0	0.0	0	0.0
Don't know	1	1.5	1	1.1	2	1.3
Total	68	100.0	90	100.0	156	100.0

When asked how long they intended to breastfeed, 24 (35.3%) women in the intervention group and 29 (32.2%) in the control group indicated they planned to breastfeed for at least six months. Twenty-six (38.2%) women in the intervention group and 29 (32.2%) women in the control group planned to breastfeed three to six months, while 8 (11.8%) in the intervention group and 12 (13.3%) in the control group planned to breastfeed for six to eight weeks. (Table 8).

Table 8

Planned Breastfeeding Duration

	Intervention		Control		Total	
	N	%	N	%	N	%
Breastfeeding duration						
6-8 weeks	8	11.8	12	13.3	20	20.7
3-6 months	26	38.2	29	32.2	55	34.8
> 6 months	24	35.3	29	32.2	52	32.9
Don't know	10	14.7	20	22.2	31	19.6
Total	68	100.0	90	100.0	158	100.0

Over one-half of the women in both the intervention and control group (67.6%, 64.4% respectively) had decided to breastfeed before becoming pregnant. Only four women decided to breastfeed after delivery. These data are presented in Table 9.

Table 9

Time of Breastfeeding Decision

	Intervention		Control		Total	
	N	%	N	%	N	%
Breastfeeding decision						
Before pregnancy	46	67.6	58	64.4	104	65.8
During pregnancy	21	30.9	29	32.2	50	31.6
After delivery	1	1.5	3	3.3	4	2.5
Total	68	100.0	90	100.0	158	100.0

Of the 158 study participants, twenty-eight (41%) in the intervention group and 35 (38.9%) in the control groups had participated in breastfeeding classes (Table 10).

Table 10

Breastfeeding Class Attendance

	Intervention		Control		Total	
	N	%	N	%	N	%
Breastfeeding class						
Attended classes	38	41.2	35	38.9	63	39.9
Did not attend Classes	40	58.8	55	61.1	95	60.1
Total	68	100.0	90	100.0	158	100.0

When asked about other resources used to prepare for breastfeeding, women cited many different breastfeeding resources, i.e., books, pamphlets, videos, Le Leche League, WIC, nurses, lactation consultants, physicians, family members and friends (Table 11).

Table 11

Other Breastfeeding Informational Resources Used

	Intervention		Control		Total	
	N	%	N	%	N	%
Books and videos	30	63.2	19	21.1	49	31.0
Family/friends	1	1.5	4	4.4	5	3.2
Health professionals	3	4.4	4	4.4	7	4.4
Le Leche League	4	5.9	1	1.1	5	3.2
None	1	1.5	9	10.0	10	6.3
Multiple sources	27	39.7	50	55.6	77	48.7
Total	67	100.0	90	100.0	158	100.0

When asked why they chose to breastfeed, mothers most commonly cited reasons that were infant-centered. The two most commonly cited reasons referred to the nutritional health benefits and the immunological properties of breast milk. Other reasons cited were bonding, naturalness of breastfeeding, cost, and maternal benefits (Table 12).

Table 12

Most Important Reasons Women Chose to Breastfeed

	Intervention		Control		Total	
	N	%	N	%	N	%
Reasons						
Best nutrition	43	63.2	54	60.0	97	61.4
Immunities	20	29.4	24	26.7	44	27.8
Bonding	2	2.9	9	10.0	11	7.0
Other	2	2.9	2	2.2	4	2.5
No answer	1	1.5	1	1.1	2	1.3
Total	68	100.0	90	100.0	158	100.0

In the immediate postpartum period, when mothers were asked what they believed would be the greatest challenge to their breastfeeding, the most frequently cited challenge was latch-on. The next two most frequently cited challenges were breastfeeding after returning to work and sore nipples. Other challenges mentioned were not producing enough milk, frequency of feeding, frustration, tiredness, breastfeeding in public, and keeping infant awake during feedings (Table 13).

Table 13

Most Important Challenges to Breastfeeding

	Intervention		Control		Total	
	N	%	N	%	N	%
Challenges						
Latch-on	25	36.8	28	31.1	52	32.9
Work	9	13.2	18	20.0	28	17.7
Sore Nipples	8	11.8	7	7.8	15	9.5
Frequency/time	7	10.3	8	8.9	15	9.5
IMS*	5	7.4	6	6.7	11	7.0
Nursing public	3	4.4	2	2.2	5	3.2
Sleepy infant	2	2.9	1	1.1	3	1.9
Other	4	5.9	10	11.1	14	8.9
Don't know	0	0.0	2	2.2	2	1.3
No answer	5	7.4	8	8.9	13	8.2
Total	68	100.0	90	100.0	158	100.0

*IMS = Insufficient milk supply

In summary, a descriptive analysis of the sample revealed that the average age of the women was 26 years of age, they had a minimum of a high school education, and were married. Over one-half of the women had decided to breastfeed before pregnancy and almost all had the support of the baby's father for breastfeeding. The health benefit related to breastfeeding was the most frequently cited reason for choosing to breastfeed, and latch-on was the most frequently cited challenge related to breastfeeding.

Data Analysis

The data, collected at six weeks postpartum, were analyzed from the Breastfeeding Attrition Tool, the H & H Lactation Scale, and the Hughes Breastfeeding Support Scale. These instruments are described in the following section and descriptive data are provided.

Breastfeeding Attrition Tool. The Breastfeeding Attrition Assessment was used to collect information on current breastfeeding practices, formula supplementation, and weaning. It also provided data on what was most satisfying about women's breastfeeding experience, what presented the greatest challenge to their breastfeeding, and what would have made their breastfeeding experience more satisfying.

In addition, the intervention group was asked to identify which component of the intervention was the most beneficial and which component was the least beneficial to their breastfeeding (postpartum visit, home visit, and phone call). These auxiliary data regarding supplementation of formula, weaning, participation in intervention and the women's breastfeeding perceptions of their breastfeeding experience will be presented separately.

Data on breastfeeding practice revealed 49 (72.1%) women in the intervention group and 61 (67.8%) women in the control group were breastfeeding at six weeks postpartum. Comparison of

women who were exclusively breastfeeding revealed minimal differences between the intervention and control groups (42.6%, 41.1% respectively). Minimal differences were also found between the partially breastfeeding intervention and control groups (29.5%, 26.7% respectively) (Table 14).

Table 14

Breastfeeding at Six Weeks Postpartum by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
Exclusive	29	42.6	37	41.1	66	41.8
Partial (Total)	8	11.8	14	15.6	22	13.9
20-80% breast milk	8	11.8	7	7.8	15	9.5
<20% breast milk	3	4.4	2	2.2	5	3.2
Token breastfeeding	1	1.5	1	1.1	2	1.3
Formula	19	27.9	29	32.2	45	30.4
Total	68	100.0	90	100.0	158	100.0

Descriptive Analysis of Instruments

H & H Lactation Scale. This instrument was a 20 point Likert scale with three subscales. The subscales measured women's confidence and commitment to breastfeeding (control factors), Maternal Confidence/Commitment Breastfeeding Subscale (MACCBS); maternal perception of infant satiety with breastfeeding, Perceived Infant Breastfeeding Satiety Subscale (PIBSS); and maternal/infant satisfaction with breastfeeding, Maternal-Infant Breastfeeding Satisfaction Subscale (MIBSS). The Likert scale was scored with "1" equals strongly agree and '7" equals

strongly disagree. Therefore, the lowest scores were equated with the most maternal commitment and confidence, perceived infant satiety, and maternal satisfaction while the highest scores were equated with the least maternal commitment and confidence, perceived infant satiety, and maternal satisfaction.

Scores on the MACCBS ranged from 10 to 45, with an average mean score of 22 and a standard deviation of 9 in the intervention group. The control group MACCBS scores ranged from 10 to 54, with an average score of 21 and a standard deviation of 9. Analysis of the items in the MACCBS revealed a Cronbach's alpha reliability coefficient of .77, which indicated the MACCBS was an internally consistent measure of maternal confidence and commitment to breastfeeding.

Scores on the PIBSS ranged from 5 to 35 in the intervention group, with an average mean score of 13 and a standard deviation of 9. The control group PIBSS scores ranged from 5 to 34, with a mean score of 12 and a standard deviation of 8. Analysis of the items in the PIBSS revealed a Cronbach's alpha reliability coefficient of .87, which indicated it was an internally consistent measure of perceived infant breastfeeding satiety.

The MIBSS scale revealed a range of scores between 5 to 35 in the intervention group, with a mean score of 11 and a standard deviation of 8. The MIBSS scores in the control group ranged from 5 to 35 with a mean of 9 and a standard deviation 7. The MIBSS subscale revealed a Cronbach's alpha reliability of .93, which indicated it was an internally reliable coefficient for this study.

The overall scores for the H & H Lactation Scale in the intervention and control groups ranged from 20-111, with average scores between 46 and 42 and a standard deviation of 22 and

The Hughes Breastfeeding Support Scale (HBSS). This instrument was a 30 point Likert scale which measured the informational, emotional, and instrumental support received by the women. The Likert scale was scored with "1" equals strongly no help and "4" equals as much help as wanted; therefore, the highest scores were equated with the most social support and the lowest scores were equated with the least amount of social support. The scores on the HBSS ranged from 49-120, with a mean score of 97 and a standard deviation of 19 in the intervention group. The control group scores ranged from 49-120, with a mean score of 91 and a standard deviation of 20. Cronbach's alpha reliability coeffecient for this scale was .95, which was acceptable for this study.

Findings Related to Hypothesis One

For analytic interpretation of the data from this study, the hypotheses were restated in the null form.

H_1: There will be no difference in breastfeeding rates at six weeks postpartum between women who participate in the breastfeeding intervention and those do who not participate in the intervention.

A chi-square analysis of breastfeeding outcomes at six weeks showed no significant differences between women in the intervention and control groups (X^2 (1, N = 158) = .164, p > .05). The data indicated 49 out of 68 women (72.1%) in the intervention group and 61 out of 90 women (67.8%) in the control group were still breastfeeding at six weeks postpartum. The null hypothesis was accepted. These data are presented in Table 15.

Table 15

Chi-square of Women Breastfeeding at Six Weeks Postpartum by Group

Group	Intervention		Control		Total	
	N	%	N	%	N	%
Any breastfeeding	49	72.1	61	67.8	110	69.6
No breastfeeding	19	27.9	29	32.2	48	30.4
Total	68	100.0	90	100.0	158	100.0

Chi Square	DF	Significance
.164	1	.686

Findings Related to Hypothesis Two

H_2: There will be no difference in maternal confidence/commitment, perceived infant satiety, maternal satisfaction, or social support between women who participate in the breastfeeding intervention and those do not participate in the intervention. A t-test was used to analyze the differences between the intervention and control groups' scores on the respective scales.

The mean on the Maternal Confidence/Commitment Breastfeeding Subscale was 22.16 for the intervention and 21.18 for the control groups. A t-test showed that this difference was not statistically significant (t (133) = .62, $p > .54$). For the purposes of this study, a score of 30 or lower on this subscale was defined as maternal satisfaction. The mean scores for both groups were consistent with the definition of maternal satisfaction.

These data are presented in Table 16.

Table 16

Means, Standard Deviations, and t-test Values for Intervention and Control Groups on Maternal Confidence/Commitment Breastfeeding Subscale (MCCBS)

Group	N	Mean	SD	t-Value	P
Intervention	61	22.16	9	0.62	.54
Control	74	21.18	9		
Total	135				

The mean on the Perceived Infant Breastfeeding Satiety Subscale was 13.15 for the intervention and 11.91 for the control groups. A t-test showed that this difference was not statistically significant (t (133) = .85, p > .40). For the purposes of this study, a score of 15 or lower on this subscale was defined as infant satiety. The mean scores for both groups were consistent with the definition of infant satiety. These data are presented in Table 17.

Table 17

Means, Standard Deviations, and t-test Values for Intervention and Control Groups on the Perceived Infant Breastfeeding Satiety Subscale (PIBSS)

Group	N	Mean	SD	t-Value	P
Intervention	61	13.15	9	.85	.40
Control	74	11.91	8		
Total	135				

The mean on the Maternal-Infant Breastfeeding Satisfaction Subscale was 10.74 for the intervention and 9.10 for the control groups. A t-test showed that this difference was not statistically significant (t (133) = 1.30, $p > .20$). For the purposes of this study, a score of 15 or lower on this subscale was defined as maternal satisfaction. The mean scores for both groups were consistent with the definition of maternal satisfaction. These data are presented in Table 18.

Table 18

Means, Standard Deviations, and t-test Values for Intervention and Control Groups on on the Maternal-Infant Breastfeeding Satisfaction Subscale (MIBSS)

Group	N	Mean	SD	t-Value	P
Intervention	61	10.74	8	1.302	.20
Control	74	9.09	7		
Total	135				

The mean on the Hughes Breastfeeding Support Scale was 97.00 for the intervention and 91.29 for the control groups. A t-test showed that this difference was not statistically significant (t (127) = 1.66, $p > .10$). For the purposes of this study, a score of 90 or higher on this scale was defined as breastfeeding support. The mean scores for both groups were consistent with the definition of breastfeeding support. These data are presented in Table 19.

Table 19

Means, Standard Deviations, and t-test Values for Intervention and Control Groups on the Hughes Breastfeeding Social Support Scale (HBSS)

Group	N	Mean	SD	t-Value	P
Intervention	60	97.00	19	1.66	.10
Control	69	91.29	20		
Total	129				

No significant differences were found between any of the groups' scores. Thus, the null hypothesis was accepted.

Findings Related to Hypothesis Three

H_3: Collectively, the intermediate outcomes, maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding, are no better predictors of breastfeeding success than any one alone.

Logistic regression was used to analyze the relationship between the intermediate outcomes and breastfeeding attrition. The intermediate outcomes were designated as the predictors and any breastfeeding (exclusive, partial and token) versus no breastfeeding was the criterion. The model chi-square indicated that the set of four predictors (three intermediate outcomes, plus intervention versus control group assignment) had a significant relationship with the breastfeeding outcome (X^2 (3, N = 129) = 47.52, $p < 05$).

Shown in Table 20, the regression coefficients for control and satisfaction were significant, but the coefficients for social support and group assignment were not. The R statistics showed that control had the strongest relationship with breastfeeding (R = -24), followed by maternal satisfaction (R = - .12). These results led to the acceptance of hypothesis three.

Table 20

Logistic Regression Model Predicting Breastfeeding Outcomes From Maternal Satisfaction With Breastfeeding, Social Support Influencing Breastfeeding and Maternal Control Regarding Breastfeeding,

Predictors	b	SE	Wald	df	R
Maternal Satisfaction	-.0868	.043	4.1448	1	-.1228*
Social Support	.0007	.014	.0027	1	.0000
Maternal Control	-.1195	.038	10.0768	1	-.2383*
Intervention	.2117	.540	.1536	1	.0000
Constant	4.7846	1.49	10.2111	1	

*p < .05

Findings Related to Hypothesis Four

Hypothesis Four: Fat content is an index of maturity of human breast milk.

Aim 1. To show that the creamatocrit is a measure of the fat content of breast milk when fat content is greater than 10%.

Aim 2. To show that the MICAM, (Maturation Index of Colostrum and Milk), is a better index of the fat content of breast milk when the fat content is less than 5%.

Twenty samples of breast milk (10 cc each) were collected from women at the University of Texas Health Science Center at San Antonio (UTHSCSA) Employee Breastfeeding Support Group and from lactating women in the postpartum unit at Wilford Hall Medical Center. Twelve breast milk samples were collected from women who had been lactating a minimum of six weeks. Two samples were from women breastfeeding term infants (48 hours and 13 days). The remaining six samples were collected from women pumping milk for preterm infants born between 23-34 weeks gestation, and had lactated between 5-21 days. No other data were collected from this sample.

Since the creamatocrit measurement is laboratory specific, a standard curve must be established for each investigator using this method to analyze breast milk fat. Linear regression was used to determine the relationship between the lipid extraction and creamatocrit measures. Three lipid extractions were performed on each of the 20 milk samples. Although repeated attempts were made to obtain the necessary data, the results of the three lipid extractions performed on each specimen indicated a wide variation of fat within each specimen. Since the lipid extraction results were inconsistent, a linear regression model of the breast milk lipid extractions was not established. Therefore, correlations between the lipid extractions and

creamatocrits could not be accomplished. It was also noted that the creamatocrits measured in triplicate revealed a high percent of fat in the breast milk samples, whereas the lipid extraction results were low. The nonlinear data were believed to be due to either erroneous creamatocrit or extraction techniques or possibly both.

Two MICAMS were performed on each milk specimen on the same piece of filter paper. Seventeen of the 20 MICAMs were found to be stage five. The remaining three MICAMs were found to be stage three. Of the 17 MICAMS assessed at stage five, five milk specimens (29.41%) were collected between 1-3 weeks postpartum; twelve milk specimens (70.59%) were collected at six or greater weeks postpartum. Of the three MICAMS assessed at stage three, milk collections were made on the second, fifth, and sixth postpartum days. (Table 21). Without the development of a standard curve between the lipid extractions and the creamatocrits, a comparison between the MICAM and the creamatocrit was not posssible. Thus, the fourth hypothesis could not be tested.

Milk maturation tests from home visit. Nine MICAMS were collected at the home visit (fourth or fifth postpartum day). MICAMS were not collected from those women who could not hand express breast milk, had sore nipples/physiological engorgement, or refused. All of the MICAMS were assessed as stage three, which indicated the mothers' milk were progressing from colostrom to transitional milk. Since all of the MICAMs were collected between the fourth and fifth postpartum day, no variations in maturation were found among the nine milk specimens.

Table 21

Results of Lipid Extraction, Creamatocrits, Creamatocrit Conversions, and MICAM

Sample	Lipid extraction g/l Dole's Method	Creamatocrit (%)	Creamatocrit converted to fat=g/l	Micam
1.	1.1	5.60	3.4	5
2.	3.2	7.60	4.8	5
3	0.6	3.25	1.8	5
4.	2.3	7.10	4.4	5
5.	1.4	9.90	6.4	5
6.	1.8	7.80	4.9	5
7.	3.6	5.00	3.0	5
8.	2.5	12.0	7.8	5
9.	3.2	14.0	9.1	5
10.	2.7	11.0	7.1	5
11.	1.2	5.00	3.0	5
12.	3.7	10.5	6.8	5
13.	0.4	6.60	4.1	3
14.	2.4	10.0	6.4	5
15.	1.5	11.0	7.1	5
16.	1.7	11.0	7.1	5
18.	3.4	9.00	5.8	5
19.	2.1	11.0	7.1	3
20.	1.6	6.60	4.1	3

Auxiliary Findings

Partial breastfeeding. The age at which women in the partial breastfeeding groups started formula ranged between one day and five weeks of age, with the mean age of two weeks. Among the women who were partially breastfeeding, various reasons were cited for supplementing formula. The three most frequently cited reasons were: 1) father involvement with infant feedings, 2) employment, and 3) insufficient milk. These were followed by: encouraging babies to sleep at night, convenience, nursing in public, and a desire for baby to become accustomed to taking a bottle. Other reasons cited were latch-on problems, maternal/infant illness, latch-on/sore nipples, thrush, ineffective breast pumps, and fatigue (Table 22).

Table 22

Maternal Reasons for Supplementation

Reason	Frequency	Percent
N = 42		
Father feed	18	43.0
Employment	15	24.0
Insufficient milk	14	33.0
Sleep at night	10	24.0
Convenience	8	19.0
Breastfeeding in public	7	16.6
Bottle use	7	16.6
Maternal/infant illness	4	9.5
Latch-on/sore nipples	4	9.5
Fatique	4	9.5

Note: Total does not sum to 100% because some women gave more than one answer.

Reasons for weaning. The age at which women weaned their babies ranged between one day and six weeks of age, with the mean age of four weeks. Returning to work and convenience were cited as the most frequent reason for weaning, followed by latch-on/sore nipples, enabling father to feed infant, insufficient milk, fatigue, and nursing in public. Other reasons included fatigue, maternal illness, cow milk protein intolerance, familiarizing infant with bottle, tired of breastfeeding, inefficient breast pumps, and a desire for infants to sleep at night (Table 23).

Table 23

Main Reasons for Weaning

Reason	Frequency	Percent
N = 47		
Employment	14	30.0
Convenience	11	23.0
Latch-on/sore nipples	10	21.0
Father feed	9	19.0
Insufficient milk	7	15.0
Fatigue	6	13.0
Nursing in public	5	11.0
Maternal/infant illness	4	8.5

Note: Total does not sum to 100% because some women gave more than one answer.

Challenges to breastfeeding. At six weeks postpartum, when asked what was the greatest challenge to their breastfeeding experience, almost half of the responders identified latch-on as their greatest challenge. This was followed by: frequency of feeds/time commitment/fatigue, sore nipples and engorgement, and insufficient milk. Other challenges mentioned were coping with a fussy baby, purchasing or renting an electric pump, and being a first-time mother. Although latch-on was cited as the greatest challenge to the women's breastfeeding, it was not the most frequently cited reason for weaning (Table 24).

Table 24

Maternal Perceptions of Greatest Challenges to their Breastfeeding

	Intervention		Control		Total	
	N	%	N	%	N	%
Latch-on	28	46.6	20	33.9	48	40.3
Fatigue/time/ Feeding frequency	9	15.0	13	22.0	22	18.5
Sore nipples	11	18.4	10	17.0	21	17.6
Nursing public	3	5.0	8	13.5	11	9.2
Employment	3	5.0	4	6.8	7	6.0
Fussy baby	3	5.0	1	1.7	4	3.4
Insufficient milk	3	5.0	1	1.7	4	3.4
Pumping	0	0.0	2	3.4	2	1.6
Total	60			59	119	

Note: Total does not sum to 100% because some women gave more than one answer or offered no response

Satisfying aspects of breastfeeding. One hundred five women (76.6%) cited bonding as the most satisfying aspect of their breastfeeding. Other satisfying aspects cited were nutritional benefits and immunological benefits. One women stated her breastfeeding experience had not been satisfying (Table 25).

Table 25

Maternal Perceptions of Most Satisfying Aspect of Breastfeeding

	Intervention		Control		Total	
	N	%	N	%	N	%
Bonding	46	73.0	59	79.7	105	76.6
Nutrition	7	11.1	9	12.2	16	11.7
Immunities	6	9.5	2	2.7	7	5.8
Other	3	4.8	3	5.4	6	5.1
Total	63		76		137	

Note: Total does not sum to 100% because some women gave more than one answer or offered no response.

Determinants of breastfeeding satisfaction. When asked what would have made your breastfeeding experience more satisfying, 34% cited avoidance of early breastfeeding problems. Early breastfeeding problems included latch-on problems, sore nipples, engorgement, and leaking. Additional early problems included delayed initiation of breastfeeding in the hospital, early pacifier use, fussy baby, flat nipples, cow milk protein, thrush, conflicting advice in the hospital, lack of professional help with breastfeeding, and being a first-time mother. Other reasons cited for interfering with breastfeeding satisfaction included not having enough milk, frequency of feedings (time commitment), returning to work, nursing in public, and a lack of availability of electric pumps. Women also mentioned more support from significant other, and availability of prenatal information. One mother suggested that a follow-up breastfeeding class and/or follow-up breastfeeding outpatient visit would have made her experience more satisfying (Table 26).

Table 26

Deterrents to Breastfeeding Satisfaction

	Intervention		Control		Total	
	N	%	N	%	N	%
Early BF problems	24	38.7	22	29.7	46	33.8
IMS	6	9.7	4	5.4	9	7.4
Employment	3	4.8	4	5.4	7	5.1
Freq./time/fatigue	4	6.5	7	9.5	9	8.1
Nursing in public	1	1.6	5	6.8	6	4.4
Total	64		74		138	

Note: Total does not sum to 100% because some women gave more than one answer or offered no response.

Within the intervention group (postpartum consultation, a home visit, and a follow-up phone call), fifty-two women found the home visit to be the most beneficial to their breastfeeding. Six women cited the postpartum visit as the most helpful and none of the women cited the phone call as being the most beneficial. Eight women cited the phone call as being the least beneficial and seven women cited the postpartum visit as being the least beneficial (Table 27).

Table 27

Most Beneficial and Least Beneficial Aspects of Breastfeeding Intervention

	Most Benefit		Least Benefit	
	N	%	N	%
Home visit	52	81.3	0	0.0
Postpartum visit	6	9.4	7	10.3
Phone call	0	0.0	8	11.3
All*	3	4.4	0	0.0
No answer	1	1.5	22	32.4
Nothing*	1	1.5	23	3 3.8

*Responses choice added by subjects

Summary

This chapter presented the results of the data analysis. In general, the two groups of breastfeeding women were homogeneous in regard to age, race, marital status, and income. A statistically significant difference was found between the two groups regarding the educational level of high school and below. Most of the women were married, lived in the same household with the baby's father, and believed the baby's father supported their breastfeeding. Most of the women had decided to breastfeed before pregnancy and planned to breastfeed for three months or more. Less than half of the women had attended breastfeeding classes, but many of the women

used multiple references and resources concerning breastfeeding. The infant health benefits related to breastfeeding were the most frequently cited reason for choosing to breastfeed. During the immediate postpartum period, latch-on problems and returning to work were perceived as the greatest challenge to their breastfeeding. Subsequently, after breastfeeding for six weeks, latch-on problems remained the most frequently cited challenge. However, the time and frequency demands created by breastfeeding were cited as the second greatest challenge. Bonding, which was minimally addressed in the immediate postpartum period, was overwhelmingly cited as the most satisfying aspect of breastfeeding. Not surprising, early breastfeeding problems were cited as the main deterrent to breastfeeding satisfaction.

The hypotheses formulated for this study with their results are summarized below.

H_1: Women who participate in a breastfeeding intervention will be less likely to terminate breastfeeding at six weeks postpartum than women who do not participate in the intervention. No significant differences were found between the intervention group and control group in regard to breastfeeding attrition.

H_2: Women who participate in a breastfeeding intervention will have higher maternal confidence/commitment, perceived infant satiety, maternal satisfaction, and social support scores at six weeks postpartum than women who do not participate in the intervention. No significant differences were found between the group scores in any of the scales.

Hypothesis $_3$: Collectively, the intermediate outcomes, maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding, are better predictors of breastfeeding success than any one alone. The results of the regression model indicated that maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control factors regarding breastfeeding at six weeks postpartum are predictors of

breastfeeding success. Maternal control regarding breastfeeding was the stronger predictor, followed by maternal satisfaction with breastfeeding.

Hypothesis $_4$: Fat content is an index of maturity of human breast milk.

Aim 1. To show that the creamatocrit is not a measure of the fat content of breast milk when fat content is > 10%.

Aim 2. To show that the MICAM, (Maturation Index of Colostrum and Milk), is not a better index of the fat content of breast milk when the fat content is less than 5%.

This hypothesis could not be tested because a linear relationship was not found between the lipid extraction and the creamatocrit. The next chapter will discuss the implications of these results.

CHAPTER V

Discussion and Summary

This study was designed to determine if a model-based intervention developed from the theory of planned behavior was effective in decreasing breastfeeding attrition. It also explored two quantitative measures of breast milk fat for potential usefulness in the major study. The study results, implications for nursing, study limitations, and recommendations for future research will be discussed in this chapter.

Sample characteristics. Most of the women in this study were in their late twenties or early thirties. They were largely Caucasian, married, and lived with their spouses or significant others. Since the sample was obtained from a military hospital, the ethnic background is representative of the military culture, but it is not representative of the geographic area. The study sample was highly representative of women who typically choose to breastfeed in regards to age, race, marital status, education, and income. Similar findings have been reported in studies investigating breastfeeding attributes (Ellerbee, Atterbury, and West, 1993; Ford and Labbok, 1990; Hill, 1991; Janke, 1993).

At six weeks postpartum, breastfeeding attrition data were obtained on 92% of the intervention group and 84% of the control group. Although there was a lower attrition rate in the intervention group than in the control group (27.9% vs. 32.2%), the difference in breastfeeding attrition between the two groups was not significant. From a review of various breastfeeding duration studies, Lawrence (1994) estimated that a 32% to 58% attrition rate occurs within the first six weeks. The findings in this study support the attrition rates cited in the literature.

There are a number of possible reasons for not finding a significant effect on breastfeeding attrition. Perhaps contact was not frequent enough in the early days following hospital discharge. It is also possible that initial contact in the third trimester might be a better time to initiate contact.

Prenatal contact would hopefully provide a degree of continuity for postpartum breastfeeding.

One of the factors that posed a potential barrier to breastfeeding was a problem with latch-on. More prenatal preparation along with consistent latch-on support in the early postpartum period might be effective in reducing latch-on problems. The use of breastfeeding dolls has been used empirically to teach latch-on and positioning, but this technique has not been tested in a prospective study. In light of the goals of Healthy People 2000, new initiatives must be developed if the goals of 75% initiation of breastfeeding at birth, and 50% duration of exclusive or partial breastfeeding at six months are to be realized (U. S. Department of Health and Human Services, 1990).

In this study, the estimated sample size needed for statistical analysis was 132 subjects. At six weeks postpartum, the questionnaire return rate was much lower in the control group than in the intervention group. This discrepancy was due in part to an inability to contact women at their six weeks postpartum visit and a low return on mailed questionnaires.

Since the sample size discrepancy is believed to have contributed to sampling bias, an attempt was made to obtain information about the women who did not complete the study. Sixteen of the 33 women (48%) in the control group were contacted by telephone to obtain information on breastfeeding duration. Thirteen of the 16 women (81%) had weaned their infants before six weeks of age. The remaining 17 women could not be located by telephone. Since the women in this study had planned to breastfeed for at least six weeks, the high attrition rate in this group supports the speculation that their breastfeeding experience had not been successful. One explanation for the discrepancy in subject attrition may be that the women who stopped breastfeeding earlier than originally planned may not have had a positive breastfeeding experience and preferred not to discuss it. Conversely, women in the intervention group may have been more willing to share their positive and negative breastfeeding experiences because of the investigator's interest in their breastfeeding success.

Findings

Hypothesis one stated: Women who participate in a breastfeeding intervention will be less likely to terminate breastfeeding at six weeks postpartum than women who do not participate in the intervention.

Despite an intensive program to educate, assist, and support primiparous breastfeeding women, this study did not demonstrate a statistically significant difference in breastfeeding attrition between the two groups. Although an attempt was made to limit the effect of interaction among the control group, there may have been some degree of contamination or Hawthorn effect. The Hawthorn effect could have influenced the study in one of two ways: 1) the initiation of a breastfeeding study on the postpartum unit stimulated the staff's interest, discussion, and promotion of breastfeeding, and, 2) the investigator enrolled subjects in both the control and intervention groups, which could have indirectly influenced breastfeeding decisions. Although six weeks postpartum is a common assessment period for breastfeeding duration, the effectiveness of the intervention may have been more accurately assessed at a different time in the postpartum period. Since the purpose of the intervention was to curtail early breastfeeding attrition, two weeks may also have been a better time to evaluate breastfeeding attrition and could possibly have lessened high subject attrition.

The maintenance of lactation for a period of time i.e., six to eight weeks is often used as a criterion for breastfeeding success (Janke, 1994; Rentschler, 1991; Richardson and Champion, 1992). Given the individual commitment and personal constraints breastfeeding imposes, a time element may not be the most effective means of measuring breastfeeding success. Maternal satisfaction may offer a better measurement of breastfeeding success than breastfeeding duration. Studies measuring breastfeeding satisfaction (Jones, 1986; Matthews, 1991) may actually provide more meaningful information than studies on duration.

Intervention studies designed to influence breastfeeding duration have produced mixed results. Two studies conducted in the 1980's, reported conflicting results in regards to the

intervention of lactation nurses' influence on breastfeeding initiation and duration (Lynch, Koch, Hislop, and Coldman, 1986; Jones and West; 1985). Using a very comprehensive intervention, Brent, Redd, Dworetz, D'Amico, and Greenburg (1995) reported a positive relationship between a breastfeeding intervention and breastfeeding duration. Their longitudinal multi-disciplinary intervention included: 1) a prenatal lactation consultation, 2) daily rounds by a lactation consultant, 3) an outpatient follow-up at 48 hours after discharge, 4) a one week follow-up visit, and 5) breastfeeding support at all future health supervision visits during the first year of life. Their results attested to the premise that health care providers can positively influence breastfeeding duration with a muliti-disciplinary team approach.

Breastfeeding intervention studies using breastfeeding telephone consultations or "hot-lines" have identified many postnatal breastfeeding problems and concerns, but none of these studies have been correlated with breastfeeding success, satisfaction, or duration (Chen et al. 1995; Gilhooly, and Helling, 1992; Simon, Johnson, and Liese, 1988). Since preventative health care dollars are often limited, it might be prudent to investigate the effects of breastfeeding telephone consultations on breastfeeding success, satisfaction and attrition.

Hypothesis two stated: Women who participate in a breastfeeding intervention will have more maternal confidence/commitment, perceived infant satiety, maternal satisfaction, and social support at six weeks postpartum than women who do not participate in the intervention.

Perceived behavioral control. Maternal commitment and confidence are two components that contribute to perceived behavioral control. In this study, no significant differences were found between the commitment/confidence scores in the intervention and control groups. The results from this study support the findings from Lawson and Tulloch (1995) which found no relationship between first-time breastfeeding mothers' confidence/commitment scores and breastfeeding duration. These investigators found breastfeeding duration was related to timing of first breastfeeding and extent of mother-infant contact in the first 72 hours after birth. Interestingly, studies which did find a positive relationships between maternal confidence and breastfeeding had subject pools that included both primiparas and multiparas and were correlated

with the decision to breastfeed (Buxton et al. 1991; Coriel and Murphy, 1988; O'Campo et al. 1992). From their results, it would appear that confidence is more closely related to breastfeeding decisions than breastfeeding duration. It is also noteworthy that studies, which did find a positive relationship between maternal confidence and breastfeeding duration, had both primaparas and multiparas in their samples (Duckett, Henley, and Garvis, 1993; Janke, 1994).

Social support. It is generally accepted that most new mothers need breastfeeding help and support for a period of time after delivery. The support is often provided via the infant's father, relatives, friends, and health professionals (Buckner and Matsubara, 1993). In this study, the women in the intervention group had higher social support scores than the women in the control group, but they were not statistically significant. Similarly, McNatt and Freston (1992) found no significantly differences in perceived social support scores of those who considered themselves successful and unsuccessful in their lactation experience.

Many studies reported that the baby's father provided major support for the maternal decision to breastfeed, as well as the decision to continue to breastfeed (Freed, Faley, and Schanler, 1992; Freed, Jones, and Schanler, 1992; Littman, Medendorp, and Goldfarb, 1994; Matich and Sims, 1992). Similarly, in this study, the overwhelming majority of women (98.5%) stated they had support from the baby's father for breastfeeding. However, "allowing the father to feed his infant" was the most frequently cited reason for supplementation. Although these findings may seem contradictory, the importance of exclusive breastfeeding in the early postpartum period may not be fully understood. Gamble and Morse (1993) reported that fathers of breastfed infants reported paternal disparities in their early relationships with their breastfed children. These differences may be due to a lack of knowledge and understanding about the breastfeeding process, or possibly unresolved issues about the father's role with his breastfed child. Gamble and Morse surmised that fathers believed they had to delay the parent-child relationship because they were left out of the inner circle of breastfeeding. Thus, what may have appeared to be a desire for early participation in the care of their breastfed baby, may have actually undermined the establishment of lactation.

Breastfeeding satisfaction. In this study, maternal satisfaction was used as a measure of maternal attitude toward breastfeeding. Other studies have used maternal breastfeeding satisfaction as a measurement of attitude toward breastfeeding. Jones (1986) used maternal satisfaction as a determinant of maternal attitude toward breastfeeding. She found that lack of breastfeeding satisfaction was related to physical reasons, such as sore nipples as well as psychological reasons, such as embarrassment and personal enjoyment. Similarly, in her assessment of maternal attitudes toward breastfeeding, Janke (1994) used personal satisfaction as a criterion on the attitudinal scale for the Breastfeeding Attrition Prediction Tool (BAPT). Although Fishbein and Ajzen (1980) believed there are differences between the measurement of attitude and satisfaction, they admit that the measure of attitude and satisfaction tap the same information pool of individual beliefs and their evaluation of these beliefs.

Although maternal satisfaction was found to be statistically significant in the regression equation, there were no statistically significant differences in the maternal satisfaction scores between the two groups. Studies which have examined the relationship between breastfeeding satisfaction and breastfeeding duration have found correlations between early expressions of low satisfaction and weaning before six to eight weeks postpartum (Humenick and Van Steenkiste, 1983; Jones, 1986; Matthews, 1991). Matthews (1991) found that women who positively assessed their infants' breastfeeding behavior had higher maternal satisfaction scores. Interestingly, she also found that infants of primiparous women had statistically significant lower scores, than infants of multiparous women.

Early breastfeeding problems such as latch-on difficulties, cracked nipples, or engorgement were the main causes of breastfeeding dissatisfaction. Personal reasons such as tiredness, time constraints, and employment seemed to be less important factors to breastfeeding satisfaction. These findings illustrate the negative consequences of the physical problems, which mothers often experience in the early days of breastfeeding. It would seem that maternal breastfeeding satisfaction could be augmented by the reduction, if not the prevention, of the early physiological breastfeeding problems.

The question of breastfeeding satisfaction is closely related with the obstacles in society, which may influence breastfeeding success. Breastfeeding requires a change in lifestyle for most women. These lifestyle changes are compounded by sociological barriers, which cause women to feel uncomfortable breastfeeding outside their homes and dictate arbitrary limitations on breastfeeding duration. These types of problems are difficult to overcome because they require major changes in societal attitudes and beliefs. The most important people who need a re-orientation of attitudes and beliefs toward breastfeeding are the breastfeeding woman' s significant others, which include both family members as well as heath care professionals.

Hypothesis three stated: Collectively, the intermediate outcomes, maternal satisfaction with breastfeeding, social support influencing breastfeeding, and maternal control regarding breastfeeding, are better predictors of breastfeeding success than any one alone.

In the theory of planned behavior, attitudes, social norms, and perceived behavioral control are equal determinants of behavior (Ajzen, 1991). In this study, significant relationships were found between maternal satisfaction and breastfeeding behavior and perceived behavioral control and breastfeeding behavior. Social norm was not found to be significant in the regression model. Similar results have been found in other studies based on the theory of planned behavior. Corby, Jamner, and Wolitski (1996) found attitudes, and perceived behavioral control were significantly related to condom use, whereas social norms were not related to condom use. Likewise, Godin, Valois, and Lepage (1993) and van Ryn, Lytle, and Kirscht (1996) found only significant relationships between attitudes and perceived behavioral control with exercising behavior.

In their study based on the theory of reasoned action, Manstead, Plevin, and Smart (1984) suggested that women's attitudes toward infant feeding method are more important determinants of infant feeding method than their perceptions of what socially significant others expect them to do. Critics of the theory of reasoned action believe that the constructs, attitude and social norms, are not as separate and distinct as portrayed in the theory (Miniard and Cohen, 1981; Sheppard, Hartwick and Warshaw, 1988; Zuckman and Reis, 1978). For example, choosing to breastfeed to

please a member of her social group may produce a positive attitude toward breastfeeding as well as provide motivation to comply with the pressures of her social support network.

Like much research in social and personality psychology, work with the theory of planned behavior relies on self-reports to assess the theory's major constructs (Beck and Ajzen, 1991). This can involve problems of social desirability in response to socially desirable behaviors such as breastfeeding. Beck and Ajzen also noted that individuals' inability to accurately assess their own ability to perform a behavior tends to reduce the ability of the model's effectiveness to predict behavior. For example, breastfeeding is sometimes believed to be a strictly instinctual natural behavior, which requires no learning. This belief may influence women to feel that they should be able to breastfeed without any preparation. While this may occur for some women, breastfeeding is more often seen as a behavior that combines learning and instinct. If women believe that all aspects of breastfeeding are instinctual, this can alter their attitude toward breastfeeding as well as their perceived behavioral control concerning breastfeeding.

Hypothesis four stated: Fat content is an index of maturity of human breast milk.

Aim 1. To show that the creamatocrit is a measure of the fat content of breast milk when fat content is greater than 10%.

Aim 2. To show that the MICAM, (Maturation Index of Colostrum and Milk), is a better index of the fat content of breast milk when the fat content is less than 5%.

A linear regression model was needed to determine the relationship between the lipid extraction and creamatocrit measures. Without the establishment of a standard curve, this hypothesis could not be tested. The nonlinear data were either due to erroneous creamatocrit or extraction techniques or possibly both.

The Dole lipid extraction method (1956) was used as the method of lipid extraction for this study. Although the Roese-Gottlieb (Horwitz, 1975) and the modified Folch (Folch, Lee, and Sloan-Stanley, 1957) are the lipid extraction methods most often cited in the literature, the Dole method was selected for this study, because it was less complicated, more economical, and believed to be an adequate method for breast milk lipid extraction. It remains unclear whether the

conflicting lipid extraction measurements were due to an inappropriate lipid extraction method or problems with technique.

Breast milk lipid measurements are also influenced by breast milk collection techniques. Factors such as time of day, quantity of milk, method of collection (manual vs. electric pump), and breast milk differences between the beginning and end of a feeding can influence results. Since the major purpose of the breast milk analysis was to familiarize the investigator with breast milk lipid physiology and to develop familiarity with breast milk analysis, only small quantities of breast milk were collected. These small quantities may have been insufficient for accurate breast milk analysis.

Findings Related to Theoretical Model

Collectively, the study results support the explanatory variables in the theory of planned behavior in predicting subsequent breastfeeding behavior. Although the present findings are largely consistent with the theory of planned behavior, there are a few points in which the theory and the findings differ.

The relationship between maternal satisfaction and breastfeeding behavior, as well as the relationship between maternal confidence/commitment and breastfeeding behavior were expected findings and consistent with the theory of planned behavior. These findings were supported by other studies, which used the theory of planned behavior as a theoretical model (Ajzen and Driver, 1992; Janke, 1994; Schifter and Ajzen, 1985). However, the role of social support in the breastfeeding model was very different from the predicted, because it had no effect on breastfeeding behavior. However, this finding was congruent with other studies using the theory of planned behavior (Corby, Jamner and Wolitski, 1996; Godin, Valois, and Lepage, 1993; van Ryn, Lytle, and Kirscht, 1996).

The lack of an association between social support and breastfeeding was an unexpected finding. A woman's social support system is depicted in the literature as playing an important role in her breastfeeding behavior. However, it is possible that a social network is more important in supporting the breastfeeding decision rather than providing actual support to breastfeeding

behavior. In the western culture, the familial loss of the breastfeeding art may influence the lack of maternal perception of social support for breastfeeding behavior.

Another explanation might be that the mother's satisfaction with breastfeeding and her perceived behavioral control with breastfeeding are much more important factors in breastfeeding behavior than the support provided by significant others. Due to the exclusive nature of the breastfeeding relationship between mother and infant, social support from significant others was limited to indirect measures of support.

Breastfeeding is a complex behavior with many potential barriers. Therefore, it was not surprising that maternal commitment and confidence demonstrated a stronger relationship with breastfeeding than maternal satisfaction regarding breastfeeding. Primiparous women can indirectly prepare to breastfeed, but the actual breastfeeding behavior requires the rapid learning of several new skills at a time that is not conducive to learning. The postpartum period is demanding for women because it is a period of physical recovery from childbirth and a time for reorganization of personal and family life-styles. Thus, it would appear maternal commitment to breastfeeding is an essential component of breastfeeding success.

Although these results do not entirely support the theory of planned behavior, they support the addition of perceived behavior control as an improvement over the theory of reasoned action. Beck and Ajzen (1991) acknowledged that additional predictive variables might be useful to help explain complex health-related behaviors. Although additional predictors may improve the model's ability to explain behaviors and guide health promotion interventions, they may create problems in understanding and operationalizing the model.

Auxiliary Findings

Prenatal intent. Over half of the women in this study (68%) had decided to breastfeed before or during pregnancy. This finding is consistent with other studies, which investigated infant feeding decisions (Aberman and Kirchhoff, 1985; Dix, 1991; Manstead, Plevins, and Smart, 1984; Manstead, Proffitt, and Smart, 1983). Coreil and Murphy (1988) concluded that prenatal intention to breastfeed was the strongest predictor of long-term breastfeeding duration, which

supports Ajzen's (1991) premise that behavioral intentions are the most important predictors of behavior. If one accepts this assumption between behavioral intention and behavior, the importance of determining when mothers make their infant feeding decision is a critical factor in planning of educational or attitudinal interventions aimed at curtailing breastfeeding attrition.

The influential factors in determining a woman's feeding choice are many and controversial. Although Williams and Pan (1994) found those women who discussed infant feeding with a physician were more likely to breastfeed, other studies (Aberman and Kirchhoff, 1985; Dix, 1991) found that physicians' and nurses' influence on maternal infant feeding choice was minimal. More frequently, husbands, partners, and family members are cited as having more influence on infant feeding decisions (Kessler, Gielen, Diener-West, and Paige, 1995; Lawrence, 1991; Matich and Sims, 1992). Regardless of maternal infant feeding choice, health care professionals do have a responsibility to give accurate information to women so that they can make informed decisions and manage breastfeeding problems correctly. Although most health care providers accept the superiority of breast milk, their educational programs have not prepared them to manage and support breastfeeding (Donnelly, 1994; Freed, Clark, Sorenson, Lohr, Cefalo, and Curtis, 1995; Goldstein, and Freed, 1993; Lawrence, 1993; Lewinski, 1992). There are some positive signs of changes in academic medicine and nursing programs (Lawrence, 1989; Naylor, Creer, Woodward-Lopez, and Dixon, 1994), but more emphasis is needed on breastfeeding management and the physiology of lactation.

Breastfeeding Classes. It was interesting to note how few women in both the intervention and control groups (37%, 36%, respectively) chose to participate in breastfeeding classes. It is unclear if women did not perceive a need for breastfeeding classes or if the classes were not scheduled at a convenient time. Although prenatal and childbirth programs are in demand by the public, their influence on selected outcome variables is controversial (Geden et al. 1985; O'Meary, 1993; Sturrock and Johnson, 1990). Wiles (1984) found a significant relationship between prenatal breastfeeding education and perceived breastfeeding success, but other studies have found no correlation between prenatal breastfeeding education and breastfeeding duration. (Hill,

1987; Nikodem, Hofmeyr, Kramer, and Gulmezoglu, 1993). Thus, it is doubtful that the low breastfeeding class participation in this study influenced breastfeeding duration.

Breastfeeding Challenges. Women cited latch-on as the greatest challenge to breastfeeding immediately postpartum and again at six weeks postpartum. Although inconsistent breastfeeding practices were empirically observed in this study, it was assumed that women in both groups were equally influenced by hospital practices. Other studies identifying practices which negatively influence latch-on; i.e., supplementation, early use of pacifiers, delayed breastfeeding initiation; add support to this finding (Gielson, Faden, O'Campo, and Paige, 1992; Hill, 1990; Lindenberg, Artola, Jimenez, 1990; Matthew, 1993). It appeared that problems surrounding learning to breastfeed are so distressing to some women that only the highly motivated persevere beyond the first few weeks. Although motivation was not directly addressed by the study, the question of internal maternal motivation versus external pressures to breastfeed should be explored. Rentschler (1991) found motivation and breastfeeding knowledge positively correlated with breastfeeding success. Similarly, Bergh (1993) found a lack of motivation as an obstacle to breastfeeding success.

A related issue to latch-on is how initial latch-on problems are managed in the early postpartum period. Contributing factors to latch-on problems are many. Artificial nipples and teats are identified in the literature as contributing factors to early latch-on problems (Kurinij and Shiono, 1991; Snell et al. 1992; Victoria, Tomasi, Olinto, and Baros, 1993). Although the phenomenon of nipple confusion as a contributing factor to latch-on problems is still controversial, Neifert, Lawrence, and Seacat (1995) formally defined nipple confusion as an infant's difficulty in achieving the correct oral configuration, latching technique, and suckling pattern after exposure to artificial nipples or teats. Unfortunately, expert opinion and clinical research have made only a questionable impact on curbing this practice. If not managed appropriately, latch-on problems can lead to a downward spiral of nipple trauma, breast engorgement, and ultimately termination of lactation for some women.

Although Jankin, Blythe, Campbell, and Carter (1995) succinctly summarized multiple research study findings supporting strong links between unsupplemented infants, unlimited suckling, and frequent episodes of breastfeeding with increased breastfeeding duration, hospital breastfeeding practices may be unfavorable to breastfeeding initiation (Powers, Naylor, and Wester, 1994). Interestingly, Wright, Rice, and Wells (1996) found that implementing the WHO/UNICEF's (1989) Ten Steps to Successful Breastfeeding in a hospital setting can contribute to an increase in breastfeeding duration.

Reasons to breastfeed. Initially, most women in this study chose breastfeeding because of the nutritional and health related benefits of breastfeeding. After breastfeeding for six weeks, seventy percent of the women identified bonding as the most satisfying aspect of breastfeeding. While women seem to be aware of the physical sensations and emotional benefits of breastfeeding, a study investigating differences between attachment behavior between mothers who chose to breastfeed and mothers who chose to bottle-feed found no differences between these two groups (Martone and Nash, 1987). However, Locklin and Naber (1993) found that attachment was primarily a descriptor of women's successful breastfeeding experience. Qualitative studies investigating bonding benefits of breastfeeding typically investigated women who chose to breastfeed for extended periods of time (Bottoroff, 1990; Hills-Bonczyk et al. 1994; Wrigley and Hutchinson, 1990). While these studies suggest that breastfeeding promotes maternal-infant attachment, it has yet to be determined whether or not breastfeeding is responsible for the relationship.

Other reasons cited for choosing to breastfeed, including immunological protection, cost, and naturalness, are consistent with reasons reported in the literature (Dix, 1991; Libbus and Kolotov, 1994). A few women cited physiological maternal benefits as important factors in their infant feeding decision. However, women do not frequently cite these reasons for breastfeeding choice. As women become more aware of the positive personal heath benefits of breastfeeding, hopefully they will include these reasons in their infant feeding decisions. Maternal benefits as

well as infant benefits of breastfeeding should be included in all educational breastfeeding programs.

Reasons to wean. In this study, combining work and breastfeeding was cited as a foreseeable challenge in the immediate postpartum period and again at six weeks postpartum. Combining working and breastfeeding requires motivation, time, commitment, a supportive employment environment, and breast pumping equipment and skill. Thus, it is not surprising that returning to work along with lack of convenience were the main reasons given for weaning. Conflicts between maternal employment and breastfeeding are frequently cited in the literature (Auerbach, 1990; Bagwell et al. 1992; Duckett, 1993; Ryan and Martinez, 1989).

While the relationship between breastfeeding and convenience is not addressed as frequently in the literature as employment and breastfeeding, Baranowski et al. (1986) found significant relationships between maternal attitudes toward breastfeeding and personal and social convenience. Similarly, Gielen et al. (1992) found that women who chose to bottle-feed believed that bottle-feeding was more convenient and allowed for more personal freedom. It is not uncommon to find conflict among women in their perception of convenience or lack of convenience as it relates to infant feeding. Gielen et al. (1992) found that women who chose to bottle-feed believed formula feeding was more convenient, and women who chose to breastfeed believed breastfeeding was more convenient. Women who perceive breastfeeding as inconvenient may associate the perceived lack of social acceptability of nursing in public with breastfeeding inconvenience. Thus, there may be a causal relationship between working women desiring to maintain lactation and their perceptions of breastfeeding convenience.

Insufficient milk supply. In this study, insufficient milk supply was cited as one of the most frequent reasons for supplementation. However, the women's reasons for their beliefs that they did not have adequate amounts of milk for their babies were not addressed by this study. Although difficult to define, insufficient milk is frequently cited as a reason for supplementation or weaning. Isabella and Isabella (1994) found the most frequent problem encountered by breastfeeding women during the initial postpartum period was a concern about insufficient milk

supply. Similarly, Hill (1991) found insufficient milk supply as the number one reason women cited for weaning. These findings were supported by other studies, which reported insufficient milk as a cause of premature weaning (Bagwell et al. 1992; Graffy, 1992; Kearney, Cronewett, and Barrett, 1990; Mogan, 1986). It was not apparent whether these infants were thriving on breast milk and their mothers were misinterpreting frequency of feeds, crying, and fussiness as hunger, or these babies were actually calorically deprived and not gaining weight. Intervention studies using Humenick's (1995) theoretical framework on insufficient milk supply should add information to this perplexing phenomenon.

Implications for Future Research

The following recommendations are made for future research:

1. Further research is needed on when and how health care providers can enhance breastfeeding. Studies are needed that investigate the relationship between breastfeeding telephone advise with specific outcome variables. Other types of interventions aimed at influencing breastfeeding decisions should be tested with various ethnic and socioeconomic women, with particular attention to social normative influences on breastfeeding.

2. Since all breastfeeding experiences may not result in the anticipated outcomes, breastfeeding termination needs to be managed in the same supportive manner as breastfeeding initiation. Research is needed to investigate feelings of guilt, inadequacy, and anxiety, for those women who do not successfully initiate breastfeeding or who terminate breastfeeding prematurely.

3. Few studies were found which examined the attitudes of children and nonpregnant adolescents toward infant feeding decisions (Berger and Winter, 1980; Baisch, Fox, Whiten and Pajewski, 1989; Yeo, Mulholland, Hirayama, and Breck; 1994). Further investigation on children's attitudes and beliefs concerning infant feeding would provide valuable information to direct age appropriate anticipatory guidance for life skills.

4. Returning to work contributed heavily to breastfeeding attrition. Investigations on obstacles women face in their work environment might assist in planning educational programs on combining breastfeeding and employment. Some employment agencies provide breast pump areas

for breastfeeding employees. Outcome data are needed on the effect of these programs on breastfeeding duration and maternal satisfaction.

5. Latch-on seems to be a major challenge to early breastfeeding. Although some of the factors that interfere with latch-on have been identified in the literature, specific techniques on timing of first feed, frequency of feeds, and mechanisms for identifying mothers and babies who are having difficulty with latch-on are needed to decrease early latch-on problems. Other issues such as the sedating affect of maternal analgesics on newborns which may influence early breastfeeding frequency has yet to be resolved.

Study Limitations

1. The homogeneous nature of the sample and sampling bias limited the generalizability of this study.

2. Subject enrollment during the first 24 hours postpartum did not allow for subject fatigue and disruption of postpartum routines. Prenatal enrollment may be a preferable time for subject enrollment for breastfeeding studies conducted in the immediate postpartum period.

3. Two sources of systemic bias were identified: sampling bias and social desirability. Attempts to minimize the sampling error include choosing a different postpartum follow-up point, and intensifying design with more subject follow-up attempts. Knowing breastfeeding is a desirable behavior may prompt women to answer in certain ways. Efforts to minimize this type of error include careful attention to non-biased wording of questions and describing the purpose of the study as seeking information on infant feeding practices rather than breastfeeding duration.

4. Another methodological concern is that the study was not blinded. The investigator, who enrolled the subject, also conducted the intervention and collected questionnaires. This may have introduced bias, as women may have been reluctant to report negative breastfeeding outcomes to her.

Clinical Implications of Study

All health care providers who care for mothers and babies need to have basic breastfeeding knowledge. Nurses are the health professionals who have the most regular contact with mothers

of newborns. Nurses are essential players in supporting breastfeeding initiation and helping mothers overcome breastfeeding obstacles.

Implications for nursing include the following:

1. With the trend toward shorter postpartum hospital stays, outpatient breastfeeding follow-up is a must. Although agencies may have funding for home visits for families that are identified as high risk, there are many others with early breastfeeding problems that need affordable avenues of support. Available prenatal and postnatal breastfeeding support is needed until breastfeeding again becomes the norm and everyone associated with a breastfeeding couple has a general knowledge about breastfeeding

2. Intensive breastfeeding support is often needed in the first few postpartum days. What appears as a simple action of attaching a baby to a breast can become a major obstacle to breastfeeding and a reason for failure. Consistent breastfeeding education and practice guidelines are needed to optimize nursing care during the brief postpartum hospital stay.

3. Educational strategies also need to target family, friends, and health care providers, with particular attention to father and partner roles in breastfeeding. Although breastfeeding does perpetuate the exclusive relationship between mother and baby, significant others need information and support on how to build a relationship with their breastfed child. Nurses play an essential role in conveying to fathers that their role in encouraging and supporting breastfeeding is extremely important. Fathers may need the opportunity to verbalize their feelings of uncertainty in of their role in breastfeeding. Feeding the baby is often perceived as the only infant care activity that can facilitate a parental bond with the new baby. Fathers may need suggestions on alternate forms of closeness, (e.g. snuggling or skin to skin contact) in order for fathers to develop an intimate relationship with their infant. Providing an atmosphere and opportunity prenatally for fathers to verbalize their feelings about breastfeeding will help deter potentially insurmountable problems in the postnatal period. Nurses need to include fathers in all breastfeeding discussions, i.e., prenatal visits, childbirth classes, as well as breastfeeding classes.

4. A breastfeeding class for mothers returning to work could provide valuable information on time management, pumping skills, and social issues surrounding breastfeeding outside the home. Women who are opposed to pumping and/or nursing outside the home need to be aware that they can give formula while away from the baby and breastfeed when they are with their infant. All breastfeeding women may benefit from a postnatal breastfeeding class to discuss breastfeeding concerns and share information.

5. The neonatal period is a unique developmental period. Parents need to understand that neonates cry for many reasons besides hunger, and to understand that neonatal fussiness is not necessarily a sign of hunger due to insufficient milk. Nurses are in a position to teach parents about the unique characteristics of newborns.

Summary

Women perceived bonding as the most satisfying aspect of their breastfeeding experience. Given the well-documented physical benefits to the infant, breastfeeding seems to have a psychological importance to many women. Women's belief that breastfeeding encompassed more than fulfilling a physiological role speaks to the overall accomplishment of nurturing their infant and the special relationship between mothers and their breastfed babies.

Although one does not want to perpetuate the myth that breastfeeding is difficult, women need to be educated on the range of initial responses of breastfed infants and appropriate maternal reactions to these responses. Because employment appears to have a negative influence on breastfeeding duration, more information is needed to understand and address the problems encountered by employed breastfeeding women in a social and cultural environment, which provides mediocre breastfeeding support.

Breastfeeding is a complex process, which is influenced by many factors. Attitudes, social support, and perceived behavioral control are important to assess when working with breastfeeding women. Women at risk for premature weaning may benefit from special attention by health care providers in the prenatal period, during the hospital stay, and immediately after discharge. Further clarity on other factors influencing breastfeeding will help identify areas where

health care providers can enhance the duration of breastfeeding. It is important to use current research findings to build new and more powerful interventions to study these issues. Special attention to areas that need further investigation include women's expectations about breastfeeding, the degree of confidence in their ability to breastfeed, the ability to adapt their lifestyles to be conducive to breastfeeding, and the appropriateness of support from significant others, family, and friends. This will take creativity and cooperation from family, health teaching staffs, and employers.

Although attitudes, social norms, and control have been indicated as influential factors to breastfeeding, how to best use this information to positively influence breastfeeding remains unclear. While external influences can foster change in attitude, social support, and confidence, a return to a breastfeeding society can only come with the evolution of social change toward breastfeeding.

APPENDIX A

Demographic Data

DEMOGRAPHIC DATA FORM

ID _____

Please circle or write in your answer.

1. What is your age _____

2. What is your race?
    1. White
    2. Black
    3. Asian
    4. Hispanic
    5. Other

3. What is your marital status?
    1. Married
    2. Single
    3. Widowed
    4. Divorced

4. What is your relationship with the baby's father?
    1. Married to father who lives in our household
    2. Living with father but not married to him
    3. Married to father who is involved but living elsewhere
    4. Not married to father who is involved but living elsewhere
    5. Father of infant not involved at this time

5. Does the baby's father support your decision to breastfeed this baby?
    1. Yes
    2. No
    3. Don't know

6. When did you decide to breastfeed?
    1. Before pregnancy
    2. During pregnancy
    3. After delivery
    4. Don't know

7. How long do you plan to breastfeed your baby?
    1. 6-8 weeks
    2. 3-6 months
    3. > 6 months
    4. Don't know

8. My total household income is:
    1. < $20,000
    2. $20,000 - $40,000
    3. $40,000 - $60,000
    4. >$60,000

9. Did you attend prenatal breastfeeding classes?
    1. Yes
    2. No

10. What other sources of breastfeeding information have you received? (friends, family, television, books, videos, doctor, nurse, Le Leche League, lactation consultant etc.)

_____
_____
_____

11. What is the highest level of education you completed? Please circle **one** answer.

    1. Grade school
    2. High school/GED
    3. Vocational/trade school
    4. Some College
    5. College graduate
    6. Graduate degree

12. What was the most important reason you chose to breastfeed this child?

_____
_____
_____

13. What do you see as the greatest challenge to your breastfeeding?

_____
_____
_____

Appendix B

Breastfeeding Procedures

code _____ date _____

PROCEDURES FOR POSTPARTUM VISIT

The PI will initially inquire about specific maternal questions and concerns. Other potential occurrences that can influence breastfeeding will be discussed. For positive answers, the PI will formulate a nursing assessment and provide an intervention based on the breastfeeding protocols. Appropriate interventions from breastfeeding protocol are indicated by the theoretical section and number in brackets. The following abbreviations are used: Attitude = ATT; Social Norm = SN; and Perceived Behavioral Control = PBC.

1. Do you have any concerns or questions about your initial breastfeeding experience?
   Yes _____ No _____
   If yes, address specific questions and concerns.

2. Have you had any breast discomfort (engorgement, sore nipples, pain with latch-on, warm spot)?
   Yes _____ No _____ [ATT = 2; PBC = 7, 9, 10]

3. Are you concerned about breast milk production (infant satisfaction, infant weight loss, infant elimination, maternal satisfaction)?
   Yes _____ No _____ [ATT = 5, 10; PBC = 3]

4. Are you satisfied with your infant's behavior at the breast (latch-on, suckling, falling asleep at at the breast)?
   Yes _____ No _____ [PBC = 1, 4]

5. Are you having any problem with positioning yourself or your baby?
   Yes _____ No _____ [PBC = 1]

6. Does your infant have any signs of jaundice?
   Yes _____ No _____

7. Have you supplemented your infant with water or formula? If yes, why _____
   Yes _____ No _____ [ATT = 4]

8. Has a doctor or nurse advised to supplement your baby? If yes, why _____
   Yes _____ No _____ [ATT = 4]

9. Do you feel your baby is crying too much?
   Yes _____ No _____ [ATT = 9]

10. If you are living with baby's father, will he be at home with you during the first week?
    Yes _____ No _____ [SN = 2]

11. Will there be friends and family available to help you with your baby?
Yes _____ No _____ [SN = 3]

12. Do you believe that there are differences between breastfeeding and bottle-feeding (protection for baby, helps uterus regain tone, promotes bonding, benefits from colostrum)
Yes _____ No _____ [ATT = 1]

code _____ date _____

Procedure for Home Visit

Arrangement for the home visit will be made at the end of the postpartum visit. The PI will call the subject at a mutually agreed time on the day of the visit to verify the PI's visit. At the beginning of the visit, open-ended questions will be asked to elicit maternal breastfeeding concerns. The purposes of the following questions are to help guide the home visit and to address the mothers' concerns.

1. Do you have any concerns or questions about your since you left the hospital?
Yes _____ No _____
If yes, address specific questions and concerns.

2. Have you had any breast discomfort (engorgement, sore nipples, pain with latch-on, warm spot)?
Yes _____ No _____ [ATT = 2; PBC = 7, 9 10]

3. Are you concerned about breast milk production (infant satisfaction, infant weight loss, infant elimination)?
Yes _____ No _____ [ATT = 5; PBC = 3]

4. Are you satisfied with your infant's behavior at the breast (latch-on, suckling, falling asleep at at the breast)?
Yes _____ No _____ [PBC = 1, 4]

5. Are you having any problem with positioning yourself or your baby?
Yes _____ No _____ [PBC = 1]

6. Does your infant have any signs of jaundice?
Yes _____ No _____

7. Have you supplemented your infant with water or formula? If yes, why? _____
Yes _____ No _____ [ATT = 4]

8. Have you been advised to supplement your baby? If yes, by whom? _____ why? _____
Yes _____ No _____ [ATT = 4]

9. Do you feel your baby is crying too much?
Yes _____ No _____ [ATT = 9]

10. Is the baby's father at home with you this week?
Yes _____ No _____ [SN = 2]

11. Are there friends and family available to help you with your baby?
Yes _____ No _____ [SN = 3]

12. Do you have any nutritional concerns (3 meals a day, fluids to quench thirst, foods from four food group, infant sensitivity to maternal diet)?
Yes _____ No _____ [ATT = 6; PBC = 4]

13. Are you planning to pump and store breast milk?
Yes _____ No _____

14. Do you have help with household chores (cooking, cleaning, washing clothes, shopping etc.)?
Yes _____ No _____ [SN = 3]

15. Do you desire to contact outside resources for breastfeeding (Lactation Consultant, Le Leche League, Healthy Mothers, Healthy Baby Coalition)? [SN = 4]
Yes _____ No _____

16. Do you have a need to pump and store breast milk?
Yes _____ No _____ [PBC = 5]

Procedure for Follow-up Phone Call

The date and time for the follow-up phone call will be made at the home visit. At the beginning of the phone call, the PI will ask mother open-ended questions about her satisfaction with breastfeeding, i.e. How do you think your breastfeeding is going? Have your previous concerns been resolved? The purposes of the following questions are to guide the phone contact and address the mothers' concerns.

1. Have any new concerns come up since our home visit?
Yes _____ No _____
If yes, address specific questions and concerns.

2. Have you had any breast discomfort (engorgement, sore nipples, pain with latch-on, warm spot)?
Yes _____ No _____ [ATT = 2; PBC = 7, 9 10]

3. Are you concerned about breast milk production (infant satisfaction, infant weight gain, infant elimination)?

Yes _____ No _____ [ATT = 5; PBC = 3]

4. Are you satisfied with your infant's behavior at the breast (latch-on, suckling, falling asleep at at the breast)?

Yes _____ No _____ [PBC = 1, 4]

5. Are you having any problem with positioning yourself or your baby?

Yes _____ No _____ [PBC = 1]

6. Does your infant have any signs of jaundice?

Yes _____ No _____

7. Have you supplemented your infant with water or formula? If yes, why _____

Yes _____ No _____ [ATT = 4]

8. Have you been advised to supplement your baby? If yes, by whom? _____ why?_____

Yes _____ No _____ [ATT = 4]

9. Do you feel your baby is crying too much?

Yes _____ No _____ [ATT = 9]

10. Is the baby's father still at home?

Yes _____ No _____ [SN = 2]

11. Are there friends and family available to help you with your baby?

Yes _____ No _____ [SN = 3]

12. Do you have any nutritional concerns (3 meals a day, fluids to quench thirst, foods from four food group, infant sensitivity to maternal diet)?

Yes _____ No _____ [ATT = 6; PBC = 4]

13. Are you planning to pump and store breast milk?

Yes _____ No _____ [PBC = 5]

14. Are you performing household chores (cooking, cleaning, washing clothes, shopping etc.)?

Yes _____ No _____ [SN = 3]

15. Do you desire to contact outside resources for breastfeeding (Lactation Consultant, Le Leche League, Healthy Mothers, Healthy Baby Coalition)? [SN = 4]

Yes _____ No _____

16. Have you had any signs of mastitis (more tired than usual, fever, achiness, chills, flu-like symptoms, localized area of breast pain, tenderness, redness or hardness)?

Yes _____ No _____ [PBC = 8]

17. Do you feel comfortable going out with your baby (embarrassment breastfeeding in public, feeling tied down)

Yes _____ No _____ [ATT = 7, 8]

18. Are you planning to go back to work?

Yes _____ No _____ [PBC = 6]

APPENDIX C

Breastfeeding Protocols

Protocol for Postpartum Visit, Home Visit, and Follow-Up Phone Call

The following protocols were developed to guide the intervention for this study. Common statements that effect a mother's attitude toward breastfeeding, her social norms influencing her breastfeeding, and her perceived behavioral control regarding breastfeeding are listed below, followed by interventions the PI will use to address each issue.

Maternal Attitudes toward Breastfeeding

The following eight statements are common misconceptions about breastfeeding that could reinforce negative breastfeeding attitudes and a dissatisfying breastfeeding experience. Mothers are more likely to have a positive attitude toward breastfeeding if erroneous myths about breastfeeding are dispelled.

1. There are no differences in breastfeeding and formula-feeding

Intervention:

Inform the mother of the following differences between breastfeeding and bottle-feeding:

a. Infant immediately received protection from the anti-infective properties found in her colostrum

b. Formulas are made from cow's milk, which has larger proteins than human infants must digest

c. Suckling stimulates uterine contractions, aids in expulsion of the placenta and control of maternal blood loss

2. Breastfed babies are more likely to become jaundiced

Intervention:

Instruct the mother on how to help prevent the physiologic jaundice:

a. Jaundice is less likely to occur with early initiation of breastfeeding

b. More frequent, longer duration feeds minimize jaundice

c. Observe infant's output for passage of meconium

3. Breastfeeding is painful

Intervention:

Impress on the mother the importance of the following basic breastfeeding guidelines:

a. Breast engorgement is prevented or minimized by early and frequent elimination of milk

b. Pain is minimized or prevented by using correct positioning and latch-on techniques

c. Babies should never be pulled off the breast to end a feeding. Release suction by sliding little finger in side of baby's mouth

4. Baby needs supplementation until milk comes in

Intervention:

Explain to the mother the basic physiological process of milk production and why supplementation can interfere with her milk production:

a. Early and frequent feedings help accelerate the lactation process

b. Colostrum is secreted in small amounts. It is made up of fats and carbohydrates. It is present in adequate amounts to nourish infant in first few days of life

c. Supplementing with water, sugar water, and formula can delay breast milk production

d. Baby's output (at least five to six very wet diapers/two to five stools per day) is a good indicator of adequate breastfeeding

5. Breastfed baby lose more weight than bottle-fed babies

Intervention:

Discuss with the mother how she can minimize her infant's initial weight loss

a. Early and frequent feedings help minimize neonatal weight loss

b. Babies should be awakened every two or three hours to nurse

c. Duration of feeds should steadily increase until 15-20 in per breast has been obtained

6. I have to give up foods that I like

Intervention:

Reassure the mother that her diet is not significantly curtailed due to her breastfeeding with the following facts about the relationship between maternal diet breastfeeding

a. There are no foods that are absolutely contraindicated with breastfeeding.

b. Some mothers find certain foods make their baby fussy.

c. Many babies do not mind what their mother eat.

d. Most babies become less sensitive as they grow

e. Smoking, recreational drugs, and alcohol are contraindicated

f. Mother should seek professional advise before taking any OTC or prescription drugs

7. Breastfeeding will tie me down

Intervention:

Discuss with mother how she can breastfeeding and still maintain her normal lifestyle:

a. Breastfeeding makes you and your baby portable

b. There is no preparation to breastfeed

c. Milk is always readily available

d. The decision to have children will change your lifestyle and your schedule.
e. Infant feeding is only one part of that decision
f. There are certain types of clothing that facilitate discreet public nursing
g. Breast milk can be pumped and stored if desired

8. Breastfeeding is embarrassing
Intervention:
Recommend several ways mother can nurse discreetly

a. It is easy to learn to breastfeed discreetly-sweaters, shawls, or baby blankets can be draped over one shoulder
b. Tops that can be unfastened from the bottom allow easier access for the baby and enhance discretion
c. If uncomfortable nursing in public, you can express milk and bring it along in a bottle

9. Breastfed babies cry a lot
Intervention:
Discuss with mother the following reasons for newborn cries:

a. Breastfed babies do need to nurse every two or three hours in the beginning
b. Babies cry when they are hungry
c. They also cry when they need to be cuddled or changed
d. The closeness gained in breastfeeding helps babies feel secure and loved
e. A baby who feels secure usually cries less often

10. If I have problems breastfeeding, there must be something wrong with me, because breastfeeding is an instinct
Intervention:
Differentiate the physiologic and learned behaviors of breastfeeding with the mother:

a. Milk production begins at birth
b. Hormonal changes occur after the delivery of the placenta
c. Prolactin (the milk hormone) levels increase and initiate milk production
d. The infant roots at the breast to find the mother's nipple which is a newborn reflex
e. The positioning, latching-on, understanding your infants hunger cues are all **learned** behaviors between mother and infant

Maternal Social Norms for Breastfeeding

Mother is more likely to a have a positive breastfeeding experience if she has a positive social environment. The significant other, particularly the baby's father, is crucial to breastfeeding success. The following interventions will be used to help mother identify and utilize her support system:

1. The role of the significant other cannot be overemphasized as an importance player in breastfeeding success. The significant other needs to bond with the baby and develop a relationship with the baby. This can be enhanced by the following action.

Intervention:

Suggest the following ways that mother can encourage her significant to get to know the new baby:

a. Holding, cuddling, soothing, and face-to-face interaction with baby
b. Provide physical care for baby
c. Comfort baby after breastfeeding

2. The significant other needs to provide support for the mother.

Intervention:

Offer the following helpful ways that the significant other can do to enhance maternal confidence and allow adequate time for rest:

a. Reassure mother that she is doing a good job
b. Show concern about mother's well-being
c. Shop for needed items
d. Listen to mother talk about baby
e. Help prepare meals
f. Entertain visitors
g. Praise her efforts to breastfeed
h. Make mother feel she is still attractive

3. Other family members, i.e., mother, mother-in-law, sister, extended family members, and friends can offer breastfeeding support in many ways.

Interventions:

Identify the mother's closest social influences and offer the following suggestions on how they can help the breastfeeding mother:

a. Provide support for mother, i.e. make arrangements for cooking, cleaning, laundry, other household chores
b. Encourage the mother to plan for household help and to spend the first week or two concentrating on her baby
c. Teach mother how to care for baby
d. Praise mother for efforts to care for baby
e. Answer telephone

f. Be supportive even if mother makes mistakes
g. Identify female relatives or friends with breastfeeding experience

4. Breastfeeding groups (lay and professional) can provide information, support, and advise from mothers who have breastfeeding experience. They can also provide management for some breastfeeding problems.

Intervention:

The PI will:

a. Discuss local breastfeeding resources with mother
b. Explain differences in lay and professional groups, i.e. Le Leche League, Lactation Consultant Groups
c. Ensure that mother understands how to access military pediatric health care system

Maternal Perceived Behavioral Control Concerning Breastfeeding

Maternal perceived control is enhanced by possessing breastfeeding skills, knowledge, and resources. Reinforcing current skills, praising breastfeeding behaviors, and teaching new skills will enhance maternal confidence.

1. Positioning (use of breastfeeding doll)

Intervention

a. Encourage to sit in comfortable chair. It is difficult for most women to find a comfortable position to breastfeed while sitting up in bed.
b. Encourage mother to bring baby to breast, not the breast to the baby
c. Suggest the mother hold her baby close so that the baby directly faces her breast and does not have to turn or strain to reach the breast.
d. Demonstrate the correct position using a breastfeeding doll. The baby's ear, shoulder, and hips should be in a straight line and his head tilted slightly back, so that he is not pulling at the breast and can swallow easily
e. Support the baby's body so that the baby feels secure
f. Explain that baby's head should be at nipple level or slightly below to facilitate an easy latch-on
g. Assess which breastfeeding position mother prefers. In the cradle hold, The mother sits up. The baby's head is resting on her forearm or in the crook of her arm. He is on his side facing her, pulled in close. This is the position that most mothers prefer
h. Suggest that mother practice positioning with weighted doll

2. Latch-on

Intervention:

Assess the mother's present latch-on technique. If found to be incorrect, teach proper latch-on skills based on the following guidelines:

a. Mother should support her breast while latching-on as well as throughout the feedings until the baby learns how to latch-on well

b. The baby needs to open wide and take the breast deeply into his mouth for a good latch-on. If the baby does not go on the breast well, encourage the mother to gently take him off and try again

c. The baby must be facing mother

d. The baby has taken an inch or more of the areola in the mouth

e. The baby is pulled so close that his chin and the tip of his nose are touching the breast

f. Once he is latched on, the baby's lips are flanged out and relaxed

g. If baby having difficulty staying latched-on, some babies do better in a clutch or football hold at mother's side

h. Reinforce if baby is not latched-on correctly, baby is not getting an adequate amount of milk and mother is at risk for sore nipples

3. Inadequate milk supply

Intervention:

a. Recommend mother use both breasts at each feeding to maximize nutrition and milk production

released with let-down and as breastfeeding continues

c. Perform Maturation Index on Colostrom and milk (MICAM) to assess maturity of breast milk (home visit only)

d. Reinforce that frequency will help increase milk supply

4. Sleepy baby

Intervention:

Using a breastfeeding doll, demonstrate the following technique to en a sleepy infant:

a. Talk to the baby. Try to make eye contact

b. Bend the baby gently into sit-ups on mother's lap, bending baby at the hips

c. Hold baby in upright or standing position

d. Rub or pat the baby's back

e. Manipulate arms and legs in a gentle "patty-cake"

Offer the following suggestions to wake the baby:

f. Try arousing when baby is in light sleep. Watch for rapid eye movements, arm and leg movement, sucking lip movement, and changes in facial expression

g. Loosen or remove blankets

h. Remove outer clothing if room is warm

i. Change the baby's diaper
j. Express milk onto baby's lip
k. Wipe the baby's forehead with a cool cloth
l. Switch the baby to your other breast as soon as your baby starts to lose interest

5. Nutrition

Intervention:

Offer the following dietary guidelines that are recommended for breastfeeding mothers:

a. Eat according to appetite, including three balanced meals/day from four major food groups
b. Food choices should include servings from four food groups
c. Drink to quench thirst
d. Avoid caffeine and alcohol
e. Prenatal vitamins and iron are to be continued
f. Foods and beverages reach breast milk about 7-8 hours after ingestion
g. Constipation or dark urine are good indications of inadequate hydration

6. Milk storage

Intervention:

Instruct mother on the proper collection and storage of breast milk:

a. Store milk in any clean plastic or glass container
b. Expressed milk should be placed in refrigerator immediately and can be kept 24 -48 hours
c. Store only enough milk for one infant feeding in each container
d. Thaw slowly-not in microwave oven
e. Breast milk can freeze in top of refrigerator for 1-2 months; deep freeze for 6 months
f. Do not add fresh milk to milk that has already been refrigerated or frozen

7. Returning to work

Intervention:

a. Assist mother in making a breastfeeding schedule that is convenient, satisfying, and flexible for herself and for infant
b. Discuss multiple ways of milk expression--by hand, manual pump, or electric pump
c. Compare and contrast the pros and cons of each method
d. Encourage mother to practice method of expression prior to returning to work
e. Suggest mother breastfeed once or twice before work and when she gets home

f. At work, pump at breaks and at lunch
g. Implement her work breastfeeding schedule one to two weeks before returning to work

8. Clogged duct

Intervention

a. Assess signs and symptoms of clogged milk duct-- warm, reddened, or swollen area that is usually unilateral with localized tenderness. No fever is present
b. Assess possible causes--limited positioning, sudden changes in feeding s schedule, skipped feeding, persistent pressure from bra
c. Suggest warm compresses four times a day
d. Breastfeed more frequently on affected side
e. Gently massage area
f. Encourage rest and increase fluids
g. Resolution should be within one to two days
h. Counsel for potential to progress to mastitis
i. Seek medical advice from health care professional if worse or not resolved in 48-72 hours

9. Mastitis

Intervention

Assess for the same signs and symptoms as clogged duct with the following additions:

a. Temperature greater than 100.F
b. Flu-like symptoms - achiness, malaise
c. Causes - same as clogged duct
d. Often associated with cracked nipple. Most often seen after 2 weeks
e. Refer to clinic/er for treatment
f. Comfort measures same as clogged duct - may continue to breastfeed

10. Sore nipples

Intervention

a. Assess for the cause of nipple soreness (baby attached to nipple only, asymmetric latch-on, traction nipple, baby's lips tucked in, baby's tongue improperly positioned, overzealous cleaning of nipples)
b. Reassess latch-on and positioning. Reinstruct if necessary
c. Investigate feeding techniques (offer breast before baby is real hungry, offer least sore side first, try different positions)
d. Try hand expression prior to feeding to soften areola and start milk flow
e. Do not over dry nipples with artificial heat, i.e. hair dryers.
f. If nipples are cracked, try purified, hypoallergenic lanolin
g. Wear nipple shells in bra to keep clothing off skin
h. Try ice or warm compresses for pain
i. If severe, may need to stop breastfeeding for 24 hours. Mother must hand

express or use gentle pumping to prevent engorgement

11. Engorgement

Intervention

a. Assess signs and symptoms (areola stretched and hard, breasts enlarged, skin stretched, nipples flattened or rigid, baby can not latch-on or extract milk)
b. If significant, suggest cool/cold gel pack initially
c. Suggest warm moist compresses, shower, hand expression, pumping until baby is able to latch-on
d. Feed frequently or pump frequently for short time periods

12. Weaning

Intervention:

Instruct mother how to slowly reduce milk her milk supply using the following guidelines

a. Explore reasons for decision to wean
b. Wean slowly over two to three weeks
c. Gradually replace one breastfeeding for a formula-feeding.
d. Wait a few days before replacing subsequent feedings
e. If breast fullness occurs, express off enough milk to relieve pressure. Do not pump to drain breast.
f. Use cold compresses for comfort if needed
g. May want to save early morning and night breastfeeding schedule
h. Observe for signs of clogged duct and engorgement

APPENDIX D

INSTRUMENTS

Breastfeeding Attrition Assessment
The H & H Lactation Scale
The Hughes Breastfeeding Support Scale

BREASTFEEDING ATTRITION ASSESSMENT

1. Which of the following describes your current infant feeding practice? Choose one.
   a. Exclusive or almost exclusive (water or juice) breastfeeding (go to question #8)
   b. Over 80 % breast milk combined with less than 20% formula (go to question # 2)
   c. Between 20-80 % breast milk and the rest is formula or solids (go to question #2)
   d. Less than 20 % breast milk (go to question #2)
   e. Breastfeeding is occasional, irregular, token or comfort (go to # 2)
   f. Exclusively formula-fed (go to question # 5)

If supplementing with formula:

2. How old was your baby when you started formula? _____

3. What were your reasons for supplementing your baby with formula? Circle all that apply.

1. Not enough milk	7. Maternal illness
2. Work/School	8. Not comfortable nursing in public
3. Convenience	9. Get baby used to bottle
4. Infant sleep through the night	10. Fatigue
5. Father and significant others can feed baby	11. Tired of breastfeeding
6. Infant illness	12. Other _____

4. From the answers you circled above, select the ONE reason that was most important in your decision to supplement your baby with formula _____

5. **If you have completely weaned your baby:**
   a. How old was your baby when you started formula? _____wks.
   b. How old was your infant when you stopped breastfeeding? _____ wks.

6. What were your reasons for weaning your baby? Choose all that apply.

1. Not enough milk	7. Maternal illness
2. Work/School	8. Do not feel comfortable nursing in public
3. Convenience	9. Get infant used to bottle
4. Baby sleep through the night	10. Fatigue
5. Father/Significant others can feed baby	11. Tired of breastfeeding
6. Infant illness	12. Other _____

7. From the answers you circled above, what was your MAIN reason for weaning?

_____

ALL MOTHERS: Please answer the following questions.

8. What would have made your breastfeeding experience more satisfying?
    1. More prenatal information about breastfeeding
    2. Earlier initiation of breastfeeding in hospital
    3. More support from significant others
    4. More availability of professional support
    5. None of the above

9. What is (was) most satisfying about your breastfeeding experience?

_____
_____
_____
_____

10. What presented the greatest challenge to your breastfeeding experience?

_____
_____
_____
_____

11. What would have made your breastfeeding experience more satisfying?

_____
_____
_____
_____

12. If you participated in the intervention part of this study (a postpartum visit, a home visit and a phone call from the investigator), what was the most beneficial to your breastfeeding?

_____
_____
_____
_____

13. What was the least beneficial? _____
_____
_____
_____

Please return your questionnaire to the box marked **BREASTFEEDING QUESTIONNAIRES**. Thank you for your participation in this study!

H & H LACTATION SCALE

For each of the following statements where 1 = strongly agree and 7 = strongly disagree, please circle the number that best describes your degree of agreement with each statement.

Maternal Confidence/Commitment Breastfeeding Subscale (MACCBS)

	Strongly agree						Strongly disagree
1. I feel brf is providing my baby with an ideal food.	1	2	3	4	5	6	7
2. I made the right decision when I decided to brf my baby.	1	2	3	4	5	6	7
3. Even though I can brf, I would rather not be breastfeeding.	1	2	3	4	5	6	7
4. Breastfeeding is a special way to console my baby.	1	2	3	4	5	6	7
5. My baby would only get a bottle if I am not available for brf.	1	2	3	4	5	6	7
6. I believe I can solve any brf problems which come along.	1	2	3	4	5	6	7
7. I feel a sense of pride from watching my baby grow from my brstmilk.	1	2	3	4	5	6	7
8. I am so upset about brf problems that I become upset at the thought of brf	1	2	3	4	5	6	7
9. I arrange my life so that brstmilk is almost the only thing my baby gets.	1	2	3	4	5	6	7
10. Overall, I would describe my brf as a relaxing activity.	1	2	3	4	5	6	7

Perceived Infant Breastfeeding Satiety Subscale (PIBSS)

11. My baby was satisfied with the amount of brstmilk received.	1	2	3	4	5	6	7
12. My baby would be hungry if I did not use formula along with brf.	1	2	3	4	5	6	7
13. I believe following brf with a bottle is how to find out if baby got enough.	1	2	3	4	5	6	7
14. I would describe my baby as being fussy after feeding.	1	2	3	4	5	6	7
15. I feel I had to give formula after brf to satisfy my baby.	1	2	3	4	5	6	7

Maternal-Infant Breastfeeding Satisfaction Subscale (MIBSS)

16. In general, I believe my baby was satisfied with brf.	1	2	3	4	5	6	7
17. In general, I was satisfied with breastfeeding.	1	2	3	4	5	6	7
18. I became more relaxed as I sat and breastfed.	1	2	3	4	5	6	7
19. My baby appeared to enjoy breastfeeding.	1	2	3	4	5	6	7
20. In general, I feel successful at brf. my baby	1	2	3	4	5	6	7

brf = breastfeeding

HUGHES BREASTFEEDING SUPPORT SCALE (HBSS)

Please circle the number that best describes the amount of help you received for each of the following statements

1 = No help at all
2 = A small amount of help
3 = Amoderate amount of help
4 = As much help as I wanted

1. Reassured me that I was doing well caring for my baby	1	2	3	4
2. Took care of the house	1	2	3	4
3. Took me to the store, church, and other places I needed to go	1	2	3	4
4. Answered my questions about breastfeeding	1	2	3	4
5. Took care of the new baby	1	2	3	4
6. Made me feel confident even when I made mistakes	1	2	3	4
7. Prepared meals	1	2	3	4
8. Answered the telephone	1	2	3	4
9. Listened to me talk about the baby	1	2	3	4
10. Did my laundry	1	2	3	4
11. Entertained visitors	1	2	3	4
12. Showed concern when I felt blue	1	2	3	4
13. Did correspondence I usually do myself	1	2	3	4
14. Shopped for needed items	1	2	3	4
15. Believed that I am a good mother	1	2	3	4
16. Lent me money for baby things	1	2	3	4
17. Was there when I felt lonely	1	2	3	4
18. Praised me for my efforts to care for the baby	1	2	3	4
19. Made me feel that I am still an attractive person	1	2	3	4
20. Showed concern about my physical condition	1	2	3	4
21. Gave me tips about breastfeeding	1	2	3	4
22. Told me about sources of help (i.e., breastfeeding social services, breastfeeding groups, etc.)	1	2	3	4
23. Showed me how to nurse my baby	1	2	3	4
24. Showed me how to bathe my baby	1	2	3	4
25. Showed me how to diaper my baby	1	2	3	4
26. Answered my questions about my baby	1	2	3	4
27. Helped me understand my baby's cries	1	2	3	4
28. Taught me how to take care of myself	1	2	3	4
29. Showed me how to hold my baby	1	2	3	4
30. Praised me for my efforts to breastfeed	1	2	3	4

APPENDIX E

Consent Forms

SGO # 96-160

INFORMED CONSENT DOCUMENT

Effects of a Model-Based Intervention on Breastfeeding

1. **Purpose and duration of the study**: I hereby volunteer to participate as a subject in this experimental study. The purpose of this study is to determine if an intervention that includes a postpartum visit, a home visit, and follow-up phone call, will have an effect on breastfeeding. The study will enroll approximately 180 women over the next 10 months from the Wilford Hall Medical Center (WHMC) Obstetric and Gynecological Clinic.

2. **Procedures**: As a participant, I understand that I will be randomly assigned to either a experimental group or a control group. If assigned to the experimental group, I will be asked to complete a demographic questionnaire and a questionnaire that assesses my risk for weaning during my first six weeks postpartum. I will also agree to participate in a postpartum breastfeeding visit, a home visit two to four days after discharge, and a follow-up phone call one week after the home visit. The postpartum visit, the home visit, and the phone call will be conducted by the investigator. The purpose of each visit is to provide breastfeeding assistance. During the postpartum visit and the home visit, the investigator will ask to observe a feeding to assess the effectiveness of your baby's latch-on and suck. During the home visit only, I will be asked to express approximately two teaspoon of breast milk so that the investigator can perform a breast milk maturation test. At my six week postpartum checkup, I will agree to complete three questionnaires concerning my satisfaction, confidence, and social support regarding breastfeeding. If assigned to the control group, I will only be asked to complete an initial demographics questionnaire, the risk assessment, and the three questionnaires at my postpartum health care visit.

3. **Risks or Discomforts**: There are no anticipated risks associated with participating in this study.

4. **Benefits**: I understand that the potential benefit of my participating in this study is that I will learn how to breastfeed for a longer period of time. I understand that there is no guarantee I will receive any benefit from this study.

5. **Alternate Treatment**: I understand that there is no alternative treatment other than that offered in this experimental study. I understand that I have the option to choose no treatment whatsoever.

6. **Record of Participation**: Records of my participation in this study may only be disclosed in accordance with federal law, including the Federal Privacy Act, 5 USC 552a, and its implementing regulations. DD form 2005, Privacy Act Statement - Health Care Records, contains the Privacy Act Statement for the records. I understand that records of this study may be inspected by the

U.S. Food and Drug Administration (FDA) I understand that everything learned about me in this study will be confidential. I understand that if the results of this study are published in a scientific magazine or book, I will not be identified in any way.

7. **Entitlement of Care**: I understand that my entitlement to medical and dental care and/or compensation in the event of injury are governed by federal laws and regulations, and if I have questions about my rights or if I believe I have received a research related injury, I may contact Wilford Hall Medical Center Patient Representative, (210) 670-6688, and/or Lt Col Sarah Wrenn, (210) 523-0418. I understand that my participation in this study does not alter my ongoing medical benefits as a military beneficiary, and I will continue to receive any needed medical treatment should I experience illness or injury as a result of this study.

8. **Medical Misadventure**: I understand that any clinical or medical misadventure will immediately be brought to my attention or, if I am not competent at the time to understand the nature of the misadventure, such information will then be brought to the attention of my guardian or next of kin.

9. **Voluntary Participation**: The decision to participate in this study is completely voluntary on my part. No one has coerced or intimidated me into participating in this program. I am participating because I want to. Lt Col Sarah Wrenn has adequately answered any and all questions I have about this study, my participation, and the procedures involved. I understand that Lt Col Sarah Wrenn will be available to answer any questions concerning procedures throughout this study. I understand that if significant new findings develop during the course of this study which may relate to may decision to continue participation, I will be informed. I further understand that I may with draw without prejudice to my entitlements to care. Should I choose to withdraw, my condition will continue to be treated in accordance with acceptable standards of medical treatment. I also understand that the investigator of this study may terminate my participation in this study at any time if she feels this to be in my best interest.

10. A copy of this form has been given to me.

_____
VOLUNTEER'S NAME AND BRANCH OF SERVICE (TYPED OR PRINTED)

_____ ___-___-___ ___-___-____ _____
VOLUNTEER'S SIGNATURE VOLUNTEER'S SSAN SPONSOR'S SSAN Date

Sarah E. Wrenn
PRINCIPAL INVESTIGATOR'S NAME (Typed or Printed)

_____ _____-___-_____ _____
PRINCIPAL INVESTIGATOR'S SIGNATURE SSAN DATE

_____
WITNESS' NAME (Typed or Printed)

_____ ____-___-____ _____
WITNESS' SIGNATURE SSAN DATE
(Must witness ALL signatures above)

TITLE OF STUDY: Effects of a Model-Based Intervention on Breastfeeding

SGO #: 96-160

Date Protocol Approved by WHMC IRB: 23 APR 96

Distributions:
White: RDA
Lt. yellow: Medical Record
Pink: PI
Dk yellow: Subject

_____
Patient's Stamp Plate or Printed Name and SSAN

PRIVACY ACT OF 1974 APPLIES
DD FORM 2005 FILED IN CLINICAL/MEDICAL RECORDS.

SGO # _____

INFORMED CONSENT DOCUMENT

Comparison of Two Methods to Evaluate Human Milk

1. **Purpose and Duration of the Study**: I hereby volunteer to participate as a subject in this experimental study. The purpose of this study is evaluate the usefulness of two tests to evaluate breast milk. The study will enroll approximately 30 lactating women over the next six months from the Wilford Hall Medical Center (WHMC) and from one breastfeeding support group (The University of Texas Health Science Center at San Antonio support Group) over the next six months. This study will be conducted in two phases. Volunteers from the University of Texas Health Science at San Antonio will be asked to participate in Phase I only. Volunteers from Wilford Hall Medical Center postpartum unit will be asked to participate in Phase I and II of the study.

2. **Procedures**: If I am asked to participate in Phase I, I will be asked to donate 10 cc. (2 teaspoonful) of breast milk on no more than two occasions. Milk will be collected after a breast pumping session. If I am asked to participate in Phase II, I will be asked to donate 2 cc (1/2 teaspoonful or less) of breast milk on my second or third postpartum day, on postpartum day 7 and postpartum day 14. I will be asked to hand express or pump my breast. I understand that the investigator, Lt Col Sarah Wrenn, will collect the milk on days 7 and 14 on a mutually agreed date and time at my home. Plastic containers will be given to me to collect the milk. I will be asked to keep my milk refrigerated until picked up by the investigator.

3. **Risks or Discomforts**: There are no anticipated risks associated with participating in this study.

4. **Benefits**: I understand that the potential benefit of my participating in this study is to identify methods of evaluating breast milk that may be helpful to clinicians in managing the progression of breastfeeding. I understand that there is no guarantee I will receive any benefit from this study.

5. **Alternate Treatment**: I understand that there is no alternative treatment other than that offered in this experimental study. I understand that I have the option to choose no treatment whatsoever.

6. **Records of Study Participation**: Records of my participation in this study may only be disclosed in accordance with federal law, including the Federal Privacy Act, 5 USC 552a, and its implementing regulations. DD form 2005, Privacy Act Statement - Health Care Records, contains the Privacy Act Statement for the records. I understand that records of this study may be inspected by the U. S. Food and Drug Administration (FDA).

7. **Entitlement to Care**: I understand that my entitlement to medical and dental care and/or compensation in the event of injury are governed by federal laws and regulations, and if I have questions about my rights or if I believe I have received a research related /or injury, I can contact the Wilford Hall Medical Center Patient Representative, 210-670-6688, and/or Lt Col Sarah Wrenn, (210) 523-0418. I understand that my participation in this study does not alter my ongoing medical benefits as a military beneficiary, and I will continue to receive any needed medical treatment should I experience illness or injury as a result of this study.

8. **Medical Misadventure**: I understand that any clinical or medical misadventure will immediately be brought to my attention or, if I am not competent at the time to understand the nature of the misadventure, such information will then be brought to the attention of my guardian or next of kin.

9. **Voluntary Participation**: The decision to participate in this study is completely voluntary on my part. No one has coerced or intimidated me into participating in this program. I am participating because I want to. Lt Col Sarah Wrenn has adequately answered any and all questions I have about this study, my participation, and the procedures involved. I understand that Lt Col Sarah Wrenn will be available to answer any questions concerning procedures throughout this study. I understand that if significant new findings develop during the course of this study, which may relate to may decision to continue participation, I will be informed. I further understand that I may with draw without prejudice to my entitlements to care. Should I choose to withdraw, my condition will continue to be treated in accordance with acceptable standards of medical treatment. I also understand that the investigator of this study may terminate my participation in this study at any time if she feels this to be in my best interest.

10. A copy of this form has been given to me.

_____

VOLUNTEER'S SIGNATURE AND BRANCH OF SERVICE (Typed or Printed)

_____	_____-____-_____	_____-____-_____	_____
VOLUNTEER'S SIGNATURE	**VOLUNTEER'S SSAN**	**SPONSOR'S SSAN**	**Date**

_____

PRINCIPAL INVESTIGATOR'S NAME (Typed or Printed)

_____	_____-____-_____	_____
PRINCIPAL INVESTIGATOR'S SIGNATURE	**SSAN**	**DATE**

_____

WITNESS' NAME (Typed or Printed)

_____ _____-____-_____ _____

WITNESS' SIGNATURE **SSAN** **DATE**

(Must witness ALL signature above)

TITLE OF STUDY: Comparison of Two Methods to Evaluate Human Milk

SGO #: _____

Date Proposal Approved by WHMC IRB: _____

Distributions
White: RDA
Lt. yellow: Medical Record
Pink: PI
Dk. yellow: Subject

SUBJECT CONSENT TO TAKE PART IN A STUDY OF THE COMPARISON OF TWO METHODS TO EVALUATE HUMAN MILK

The University of Texas Health Science Center at San Antonio
University Hospital

We are asking you to take part in a research study that will investigate the fat content and maturity of breast milk. We want to learn about the usefulness of two different tests that are designed to analyze breast milk. We are asking you to take part in this study because you can provide us with samples of breast milk. The study will be conducted in two phases. You will be asked to participate in either Phase I or Phase II. Phase I will consist of breastfeeding women from the postpartum unit at University Hospital or the University of Texas Health Science Center at San Antonio Employee Breastfeeding Support Group. Phase II will consist of breastfeeding mothers from the postpartum unit at University Hospital.

If you are asked to participate in Phase I, you will be asked to donate 10 cc. (2 teaspoonful) of breast milk on no more than two occasions. If you are an employee, you will be asked to collect milk at a routine visit to the Breastfeeding Employee Support Group pump area. If you are a postpartum mother, you will be asked to collect milk between 6:00 AM and 3:30 PM after a breast pumping session on the postpartum unit. Plastic containers will be provided to you by the investigator. You will be asked to write date and time of collection on the label provided with the container and place milk sample in a refrigerator designated for milk samples. The investigator will pick up milk samples at 4:00 PM or another mutually agreed time.

If you are asked to participate in Phase II, you will be asked to donate 2 cc (approximately 1/2 teaspoonful or less) of breast milk on your first or second postpartum day, on postpartum day 7 and postpartum day 14. You will be asked to hand express or pump your breast. The initial sample will be collected after agreeing to participate in the study. On postpartum days 7 and 14, you will be asked to collect milk samples at the end of a feeding between 8:00 AM and 10:00 AM. The investigator, Sarah Wrenn, will collect the milk samples from postpartum days 7 and 14 within 24 hours of collection on a mutually agreed date and time at your home. Plastic containers will be given to you to collect the milk prior to discharge. You will be asked to write the date and time on the label provided with the container. You will be asked to keep your milk sample refrigerated until picked up by the investigator. The investigator will call you on postpartum day 6 and 13 to verify agreed collection date and time.

There are no anticipated risks associated with participating in this study.

Everything we learn about you in the study will be confidential. If we publish the results of the study in a scientific magazine or book, we will not identify you in any way.

Your decision to participate in this study is voluntary. You are free to choose not to take part or to stop taking part at any time. If you choose not to take part or to stop at any time, it will not

effect your future medial care or your status as an employee at the University of Texas Health Science Center at San Antonio or University Hospital.

If you have questions now, feel free to ask us. If your have additional questions later, Sarah Wrenn, Principal Investigator, can be reached at 210-523-0418. The University of Texas Health Science Center committee that reviews research on human subjects (Institutional Review Board) will answer any questions about your rights as a research subject (567-2351).

We will give you a copy of this form to keep.

"YOUR SIGNATURE INDICATES THAT YOU HAVE DECIDED TO TAKE PART IN THIS RESEARCH STUDY AND THAT YOU HAVE READ AND UNDERSTAND THE INFORMATION GIVEN ABOVE AND EXPLAINED TO YOU."

_____ _____

Signature of Subject Signature of witness

_____

Signature of Investigator

_____/_____

Date Time

APPENDIX F

Institutional Review Board

31 May 96

MEMORANDUM FOR PSP/Lt Col Wrenn

FROM: WHMC/RDA (2-7143)

SUBJECT: Clinical Investigation **#96-160**, "Effects of a Model-Based Intervention on Breastfeeding"

1. The Surgeon General's Clinical Investigation Committee has approved your proposal and has assigned file number SGO 96-160 (Atch). Please refer to this number in future correspondence regarding the study.

2. To assist in the proper accomplishment of this investigation, you must comply with AFI 40-403 as it pertains to progress and final reports, proper maintenance of records, and the application of written informed consent to all study participants. Specific requirements are outlined in the attached letters, WHMC/RDA, 1 Sep 94, Subj: Requirements for Conduct of Clinical Investigations, and WHMC/CC, 11 Nov 94, Subj: Medical Misadventures in Clinical Investigation.

3. Attached is an Informed Consent Document (ICD) Checklist. The primary investigator and all approved associate investigators should use this checklist when completing ICDs. Approved ICDs are maintained on file by RDA and copies can be requested by calling ext. 2-7184. Forty (40) sets of your ICDs have been ordered through base reproduction and will be forwarded to you in about two weeks.

4. Investigators are encouraged to obtain and use a laboratory notebook for recording their data. Notebooks may be obtained from the CID Laboratory Supply Custodian, ext. 2-7159.

PATTY ALLEN
Protocol Coordinator
Clinical Investigations

Attachments
HQ AFMOA/SGOT Ltr, 28 May 96
WHMC/RDA Ltr, 1 Sep 94
WHMC/CC Ltr, 11 Nov 94
ICD Checklist

The University of Texas
Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7830

Institutional Review Board
(Multiple Assurance #1403)

(210) 567-2351
FAX: (210) 567-2360

June 7, 1996

Lt. Col. Sarah E. Wrenn, R.N.
6302 Ridgehurst
San Antonio, TX 78250

Dear Lt. Col. Wrenn:

Re: IRB Protocol #956-0020-314 **Effects of a Model-Based Intervention on Breastfeeding (WHMC)**

This protocol was approved as submitted on June 7, 1996, under DHHS Regulation **46.110(2) and (9)** for **EXPEDITED** review: 46.110(2) Collection of excreta and external secretions including sweat, uncannulated saliva, placenta removed at delivery and amniotic fluid at the time of rupture of the membrane prior to or during labor. 46.110(9) Research on individual or group behavior or characteristic of individuals, such as studies of perception, cognition, game theory, or test development, where investigator does not manipulate subjects' behavior and the research will not involve stress to subjects.

This approval will be endorsed by the full Board and recorded in the minutes at the next convened IRB meeting on June 11, 1996.

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR:

(1) report **immediately** to the IRB all deaths of subjects, regardless of cause;

(2) report **immediately** to the IRB any severe adverse reaction or serious problem, whether anticipated or unanticipated;

(3) report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part;

(4) insure that only formally designated investigators (as approved by the IRB) enroll subjects;

(5) submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change;

(6) submit a **Progress Report** for continuing review by the IRB. Federal regulations require IRB review of on-going projects no less than once a year (a Progress Report will be sent to you in 10 months); and

(7) notify the IRB when the study has been completed and prepare a final report.

NEXT IRB REVIEW: APRIL 1997

(Note: Approval may need to be obtained from the appropriate hospital committee(s) prior to the implementation of this study.)

Wayne P. Pierson, Ph.D., Director, IRB

The University of Texas
Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7830

Institutional Review Board
(Multiple Assurance #1403)

(210) 567-2351
FAX: (210) 567-2360

May 14, 1997

Lt. Col. Sara E. Wren, R.N.
6302 Ridgehurst
San Antonio, TX 78250

Dear Lt. Col. Wren:

CONTINUING REVIEW - IRB Protocol #956-0020-314 **Effects of a Model-Based Intervention on Breastfeeding (WHMC)**

In accordance with Federal regulations for continuing review, the Institutional Review Board **reapproved** the above referenced protocol at a convened meeting on May 13, 1997. The study is closed to new subject enrollment. The data are being analyzed and a final report is pending.

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:

(1) report **immediately** to the IRB all deaths of subjects, regardless of cause;

(2) report **immediately** to the IRB any severe adverse reaction or serious problem, whether anticipated or unanticipated;

(3) report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part;

(4) insure that only persons formally approved by the IRB enroll subjects;

(5) submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change;

(6) submit a **Progress Report** for continuing review by the IRB. Federal regulations require IRB review of on-going projects no less than once a year. A Progress Report will be sent to you in 10 months so that the review and reapproval of this study can be accomplished within the one-year time frame; and

(7) notify the IRB when the study has been completed and prepare a final report.

Sincerely,

Robin L. Brey, M.D.
Subcommittee Chair
Institutional Review Board

DATE OF NEXT IRB REVIEW: March 1998

31 May 96

MEMORANDUM FOR PSP/Lt Col Wrenn

FROM: WHMC/RDA (2-7143)

SUBJECT: Clinical Investigation **#96-161**, "Comparison of Two Methods to Evaluate Human Milk"

1. The Surgeon General's Clinical Investigation Committee has approved your proposal and has assigned file number SGO 96-161 (Atch). Please refer to this number in future correspondence regarding the study.

2. To assist in the proper accomplishment of this investigation, you must comply with AFI 40-403 as it pertains to progress and final reports, proper maintenance of records, and the application of written informed consent to all study participants. Specific requirements are outlined in the attached letters, WHMC/RDA, 1 Sep 94, Subj: Requirements for Conduct of Clinical Investigations, and WHMC/CC, 11 Nov 94, Subj: Medical Misadventures in Clinical Investigation.

3. Attached is an Informed Consent Document (ICD) Checklist. The primary investigator and all approved associate investigators should use this checklist when completing ICDs. Approved ICDs are maintained on file by RDA and copies can be requested by calling ext. 2-7184. Forty (40) sets of your ICDs have been ordered through base reproduction and will be forwarded to you in about two weeks.

4. Investigators are encouraged to obtain and use a laboratory notebook for recording their data. Notebooks may be obtained from the CID Laboratory Supply Custodian, ext. 2-7159.

Patty Allen

PATTY ALLEN
Protocol Coordinator
Clinical Investigations

Attachments
HQ AFMOA/SGOT Ltr, 30 May 96
WHMC/RDA Ltr, 1 Sep 94
WHMC/CC Ltr, 11 Nov 94
ICD Checklist

The University of Texas
Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7830

Institutional Review Board
(Multiple Assurance #1403)

(210) 567-2351
FAX: (210) 567-2360

TO: Sarah E. Wrenn, Lt. Col.
6302 Ridgehurst, San Antonio, TX 78250

DATE: June 18, 1996

FROM: **Institutional Review Board**

SUBJ: IRB Protocol #956-0020-289 **Comparison of Two Methods to Evaluate Human Milk (UTHSCSA, UH, WHMC)**

REQUESTS:

_____ Revised Consent Form(s)

_____ Protocol Modification/Addendum

_____ Change in Title

_____ Addition/Deletion of Investigator

_____ Spanish Translation of Consent Form(s)

_____ Conditions Met

__X__ Other

ADMINISTRATIVE ACTION:

__X__ Approve

_____ Clarification Required

_____ Disapprove

COMMENTS: This is in reference to your request dated June 17, 1996.

Approval was given on June 18, 1996, to receipt of the WHMC IRB approval and consent form. Approval is now given to conduct the study at that site.

DATE OF NEXT IRB REVIEW: March 1997

Wayne P. Pierson, Ph.D., Director, IRB

The University of Texas
Health Science Center at San Antonio
7703 Floyd Curl Drive
San Antonio, Texas 78284-7830

Institutional Review Board
(Multiple Assurance #1403)

(210) 567-2351
FAX: (210) 567-2360

April 16, 1997

Sarah E. Wrenn, Lt. Col.
6302 Ridgehurst
San Antonio, TX 78250

Dear Dr. Wrenn:

CONTINUING REVIEW - IRB Protocol **#956-0020-289 Comparison of Two Methods to Evaluate Human Milk (UTHSCSA, UH, WHMC)**

In accordance with Federal regulations for continuing review, the Institutional Review Board **reapproved** the above referenced protocol at a convened meeting on April 15, 1997. The study is closed to new subject enrollment. The data are being analyzed and a final report pending.

RESPONSIBILITIES OF PRINCIPAL INVESTIGATOR FOR ONGOING PROTOCOLS:

(1) report **immediately** to the IRB all deaths of subjects, regardless of cause;

(2) report **immediately** to the IRB any severe adverse reaction or serious problem, whether anticipated or unanticipated;

(3) report any significant findings that become known in the course of the research that might affect the willingness of subjects to continue to take part;

(4) insure that only persons formally approved by the IRB enroll subjects;

(5) submit for review and approval by the IRB all modifications to the protocol or consent form(s) prior to the implementation of the change;

(6) submit a **Progress Report** for continuing review by the IRB. Federal regulations require IRB review of on-going projects no less than once a year. A Progress Report will be sent to you in 10 months so that the review and reapproval of this study can be accomplished within the one-year time frame; and

(7) notify the IRB when the study has been completed and prepare a final report.

Sincerely,

Wayne P. Pierson, Ph.D.
Subcommittee Chair
Institutional Review Board

DATE OF NEXT IRB REVIEW: **February 1998**

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VITA

Sarah Elizabeth Wrenn was born in Weston, West Virginia on February 6 1953, daughter of Bill and June Blake. She received a diploma in nursing in 1974 from Petersburg Hospital School of Nursing, Petersburg Virginia, followed by a Bachelor of Science in Nursing from Hampton University, Hampton, Virginia. In 1977, she married Michael Dane Wrenn. She continued her education at the University of Virginia, where she received a Master of Science in Nursing and a pediatric nurse practitioner certificate in 1980. She began her career as a pediatric nurse practitioner at the Newport News Health Center, Newport News, Virginia. In 1981, she received her certification as a pediatric nurse practitioner from the National Board of Pediatric Nurse Practitioners and Pediatric Nurses. In the same year, she was commissioned as an officer in the U.S. Army Nurse Corps. Subsequently, she transferred to the U. S. Air Force, where she continued her career as a pediatric nurse practitioner at Maxwell AFB, Montgomery Alabama. While at Maxwell AFB, she completed a Master of Arts in Teaching from Troy State University at Montgomery. In 1989, she was transferred to Wilford Hall Medical Center, San Antonio, Texas, where she was a pediatric nurse practitioner and clinical instructor for the USAF pediatric nurse practitioner certificate program. During this assignment, she attained certification as a lactation consultant from the International Board of Certified Lactation Examiners. In 1993, she entered the Graduate School of Biomedical Sciences, University of Texas Health Science Center at San Antonio. Two years later, she was selected by the Air Force Institute of Technology for full-time study to complete her doctoral program. During her doctoral studies, she completed the post-master's family nurse practitioner program. In 1996, she received a grant from the Tri-Service Nursing Research Group, which partially funded her research in breastfeeding.